USER MANUAL

ETU02-MUX

2/4 Port G.703 E1 Multiplexer with SNMP

CTC Union Technologies Co.,

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ETU02-MUX 4 Port MUX, Fractional E1, Installation and Operation Manual
Version 3.0 May 2008

This manual supports the following models:
ETU02-MUX.2-XX-AC, 2 Port MUX, universal AC
ETU02-MUX.2-XX-DC, 2 Port MUX, DC model
ETU02-MUX.2-XX-DP, 2 Port MUX, Dual Power AC+DC model

ETU02-MUX.4-XX-AC, 4 Port MUX, universal AC
ETU02-MUX.4-XX-DC, 4 Port MUX, DC model
ETU02-MUX.4-XX-DP, 4 Port MUX, Dual Power AC+DC model

Firmware Version notice:
V1.16 Last version of old ETU02-MUX, 2 or 4 port operation
V1.20 Main and Sub reversed, no Sub E1 support, 2 or 4 port (interim version)
V1.21 New Version, 4 port, supports optional Sub E1
V1.22 New Version, 2 port, supports optional Sub E1
V1.37 Version as of printing, 2 ports, supports SNMP option and added loop back features
V1.38 Version as of printing, 4 ports, supports SNMP option and added loop back features
V1.39 Corrected Test LED to light during V.54 Loopback
V1.40 fixed a bug in Timeslot mapping in SNMP
V1.41 Make Sub E1 SI bit follow Main E1 SI bit
V1.42 Add 4 digit password protection to LCD

Table of Contents

Chapter 1. Introduction 7
1-1. Introduction 7
1-2. Functional Description 7
1-3. Typical System Applications 9
1-4. E1 signal structure 10
1-5. *ETU02-MUX* Capabilities 11
1-6. TECHNICAL SPECIFICATIONS 13
Chapter 2. Installation 17
2-1. General 17
2-2. Site Preparation 17
2-3. Mechanical Assembly 17
2-4. Electrical Installation 17
2-4-1. Power connection 17
2-4-2. Rear panel connectors 17
2-5. DIP Switch Setting and DATA Interface Module Replacement 19
2-5-1. Caution 19
2-5-2. Procedure 19
Chapter 3. Front Panel Operation 21
3-1. General 21
3-2. Controls and Indicators 21
3-3 Menu Operation 22
3.3.1 Top Level Menus 22
3.3.2 System Parameter Detail 24
3.3.3 Main Link Parameter Detail 25
3.3.4 Sub Link Parameter Detail 25
3.3.5 Timeslot Mapping Detail 26
3.3.6 Data Port Parameter Detail 26
3.3.7 Control Port Parameter Detail 28
3.3.8 Loop back Parameter Detail 28
3.3.9 BERT Test Detail 29
3.3.10 Date & Time Display & Set Detail 30
3.3.11 Miscellaneous Setup Detail 30
3.3.12 Alarm Buffer Display Detail 32
3.3.13 Performance Monitor Display Detail 32
Chapter 4. Console Port Operation 33
4-1 General 33
4-2 Terminal Connection 33
4-3 Menu System Detail 34

Table of Contents

Chapter 5. Test and Diagnostics 67
5-1. General 67
5-2. Status Indicators and Messages 67
5-3. User activated loop back. 70
Chapter 6. SNMP Operation 79
6-1 Introduction 79
6-2 Required tools and supplies 79
6-3 Installation Procedure (Please refer to the attached drawing) 79
6-4 SNMP Overview 81
6-5 Configuring the ETU02-MUX SNMP Agent 83
6-6 MIB detail for ETU02-MUX 86
6-7 ETU02-MUX Trap Codes 93
Chapter 7. Troubleshooting Instructions 95
Appendix A. DIP Switch Setting 97
A-1 DSW1 Setting 97
A-2 DSW2 Main E1 Line Impedance Setting 97
A-3 SW1 Sub E1 Line Impedance Setting 97
A-4 Jumper CHASS1 Frame Ground Setting 97
Appendix B. Connections 99
B-1. E1 Line Connectors 99
B-1.1 D-15 connector 99
B-1.2 BNC connector 99
B-2. RS-232/Alarm Port Connector 100
C-1. X.21 Data Channel Module 100
C-2. V.35 Data Channel Module 102
C-3. RS-530 Data Channel Module 103
C-4. RS-232 Data Channel Module 104
C-5. RS-530 to RS-449 Adapter Cable 105
C-6. G.703-64K Co-directional Interface Module 106
C-7. NRZ/BNC 64K ~ 2048Kbps NRZ Interface Module 107
C-8. ET10/100 Ethernet Bridge Module 108
C-9. ET100R Ethernet Router Module 109
Appendix D. Menu System 111

Chapter 1. Introduction

1-1. Introduction

The ***ETU02-MUX*** provides an economical multiplexing solution for E1 and Fractional E1 network services. Up to two (or four depending upon model) DTE devices may be linked to an ***ETU02-MUX*** at combined data rates of 56Kbps to 1984Kbps. The ***ETU02-MUX*** also provides one optional E1 sub-link, which may be connected over a public E1 network. The E1 sub-link will perform Drop & Insert with user-defined timeslot connections from a PABX or other E1 equipment to E1 network services.

The ***ETU02-MUX*** supports local control and diagnostics via the LCD display, keypad and LED status indicators located on the front panel or via the console port connection. The optional SNMP port provides SNMP Simple Network Management Protocol System functions, which allow the user to remotely control and diagnose the system. These features enable users to easily configure the unit, execute the in-service diagnostics and monitor the network status either locally or remotely.

1-2. Functional Description

The ***ETU02-MUX*** data channels support user-selectable transmission rates, which are integer multiples of 56 or 64kbps, up to a maximum 1.984Mbps (31 timeslots), for a line attenuation of up to -43 dB on twisted pair or coax cable. An integral LTU is built-in, providing an approximate operating range of up to 2km (using 22AWG).

The ***ETU02-MUX*** packs the data channels into E1 link time slots in user-selected time slots, the unused time slots may insert IDLE code or any user selectable code.

As of the writing of this manual, the ***ETU02-MUX*** has nine types of user-replaceable data channel modules, which include: RS-232, V.35, X.21, RS-530, RS-449, G.703 64k Co-directional, NRZ, 10/100Base-TX Bridge and 10/100Base-TX Router.

The ***ETU02-MUX*** fully meets all of the E1 specifications including ITU G.703, G.704, G.706, G.732, and G.823.

The ***ETU02-MUX*** features V.54 diagnostic capabilities for performing remote digital loop back. The operator at either end of the line may test both the ***ETU02–MUX*** and the E1 line in the digital loop back mode. The loop back is controlled by either menu selection on the local LCD, local terminal, SMNP or by the DTE interface for V.35, RS-232 and RS-530. Other, non-standard loop back options are also available via LCD, local terminal or SNMP control.

During loop back testing an internal pseudo random test pattern is generated, according to ITU-T, for direct end-to-end integrity testing. The Error indicator flashes for each bit error detected.

Multiple clock source selection provides maximum flexibility in connecting both the E1 and user interfaces. The ***ETU02-MUX*** has the flexibility to meet the timing requirements of various system configurations. The timing mode for the E1 link and for the user channel are selected by the setting of configuration data via the front panel LCD display, terminal mode console port, or via option SNMP management connection. The E1 link may be clocked from the E1 recovered receive clock (main E1 link or sub E1 link), from any one of the user data ports, or from the internal oscillator.

The ***ETU02-MUX*** AC model operates from 90VAC ~ 250VAC while the DC model operates from 18 to 72VDC. The DP or Dual Power model provides connection to both AC and DC power sources. The unit is built in a single unit EIA compliant 19” rack mountable case that may also be placed on desktops or shelves.

1-3. Typical System Applications

General

In a typical application (Figure 1-1), the ***ETU02-MUX*** is used to connect the synchronous data channels of two routers and the local and remote LANs over an E1 line.

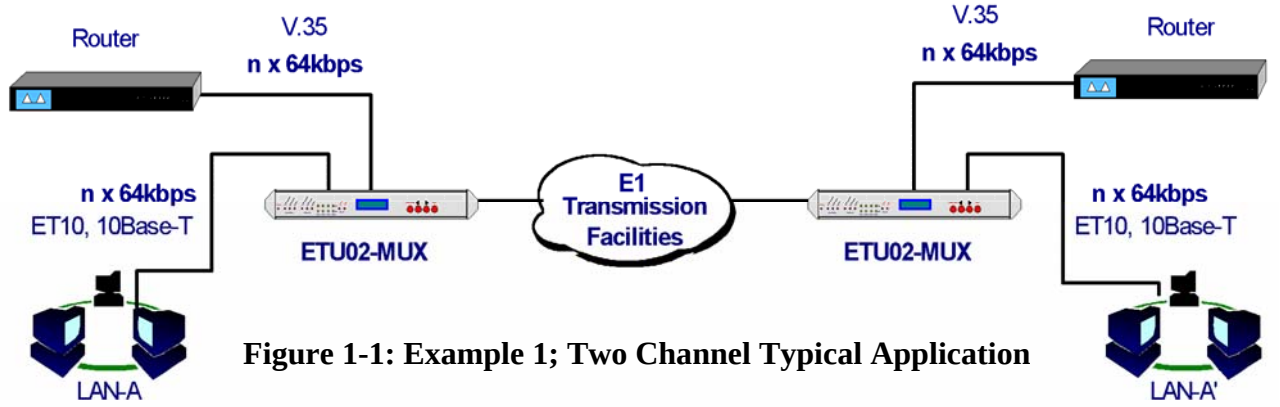


Figure 1-1: Example 1; Two Channel Typical Application

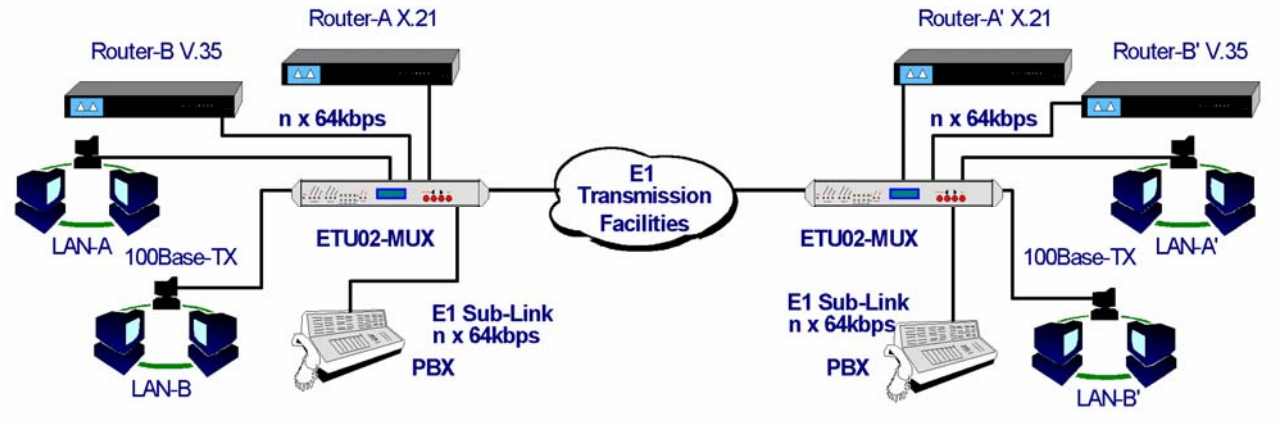


Figure 1-2: Example 2; Four Channel plus E1 Sub-Link Application

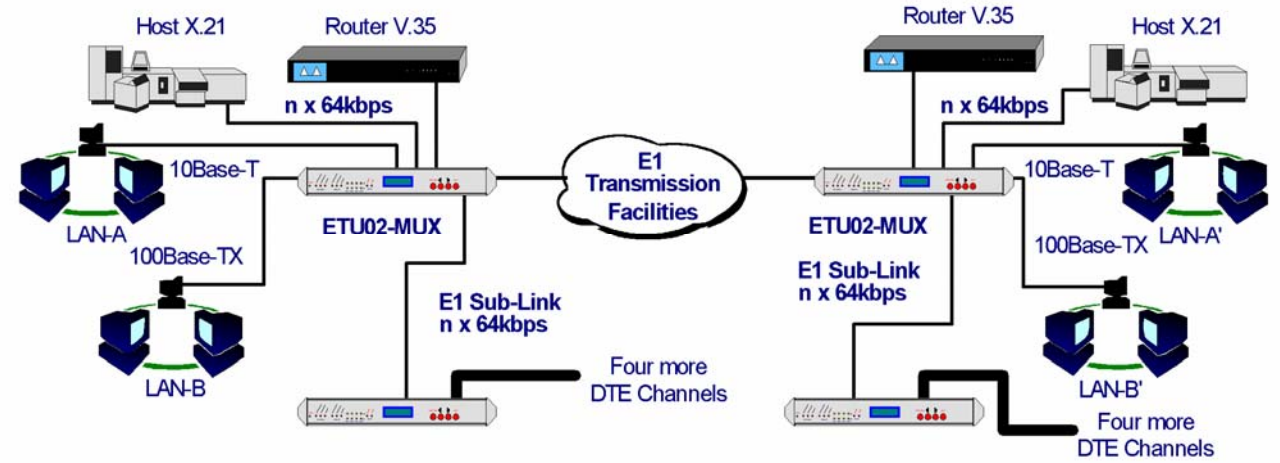


Figure 1-3: Example 3; Cascade ETU02 from E1 Sub-Link Application

The fractional E1 data service is based on the assumption that the combined user data rate of all channel modules plus Sub-Link is equal to or is a fraction of the full available E1 bandwidth, in multiples of 56K or 64K. Up to four data channels may be connected plus an optional E1 sub-link.

1-4. E1 signal structure

The E1 line operates at a nominal rate of 2.048Mbps. The data transferred over the E1 line is organized into frames, with each E1 frame containing 256 bits. The 256 bits are organized as 32 time slots of eight bits each and carry the data payload.

E1 transmissions utilize two main types of framing: **Frame Alignment Signal** (FAS) and **Multi-Frame Alignment Signal** (MFAS). Framing is necessary in order for equipment receiving the E1 signal to be able to identify and extract the individual channels. **PCM-30** (CAS) transmission systems use MFAS framing along with FAS framing. **PCM-31** (CCS) transmission systems use only FAS framing.

Frame Alignment Signal (FAS)

The 2.048 Mbps frame consists of 32 individual time slots (numbered 0-31). As described previously, each time slot consists of an individual 64 Kbps channel of data. In the FAS format, time slot 0 of every other frame is reserved for the frame alignment signal pattern. Alternate frames contain the FAS Distant Alarm indication bit and others bits reserved for national and international use.

Multi-Frame Alignment Signal (MFAS)

MFAS framing uses **Channel Associated Signaling** (CAS) to transmit the A/B/C/D bits signaling information for each of 30 channels. This method uses the 32 time slot frame format with time slot 0 dedicated for the **Frame Alignment Signal** (FAS) and time slot 16 dedicated for the **Multi-Frame Alignment Signal** (MFAS) and the **Channel Associated Signaling** (CAS).

E1 line signal

The basic E1 line signal is coded using the **Alternate Mark Inversion** (AMI) or **HDB3** rule.

In the AMI format, “ones” are alternately transmitted as positive and negative pulse, whereas “zeros” are transmitted as a zero voltage level. AMI is not used in most 2.048 Mbps transmissions because synchronization loss occurs during long strings of data zeros.

In the HDB3 format, a string of four consecutive zeros is replaced with a substitute string of pulses containing an intentional bipolar violation. The HDB3 code substitutions provide high pulse density so that the receiving equipment is able to maintain synchronization with the received signal.

1-5. *ETU02-MUX* Capabilities

E1 link line coding

The ***ETU02-MUX*** supports two E1 line codes:
AMI coding.
HDB3 coding.

E1 framing formats

The ***ETU02-MUX*** supports three formats:
Unframed format. (in Unframed, only Data port 1 is supported)
FAS (CCS, PCM-31) format. (TS0 reserved)
MFAS (CAS, PCM-30) format. (TS0 and TS16 reserved)

User data channel rates

The ***ETU02-MUX*** supports user data channel rates which are a multiple of 56 or 64kbps. For maximum flexibility, the ***ETU02-MUX*** supports combined data rates up to 1.984Mbps. The ***ETU02-MUX*** supports flexible time slot assignment, allowing the user to freely specify the selection of time slots, in sequence or randomly, for each data channel.

User data channel interface

The ***ETU02-MUX*** has nine types of user data channel modules: RS-232, V.35, X.21, RS-530, G.703 64K Co-directional, NRZ, 10Base-T Bridge, 10/100Base-TX Bridge and 10/100Base-TX Router. The ***ETU02-MUX*** also supports RS-449 data channel via an interface adapter cable attached to the RS-530 channel module. The desired interface is achieved by installing the appropriate type of channel module in the ***ETU02-MUX***. The ***ETU02-MUX/2*** supports two data channel modules, while the ***ETU02-MUX/4*** supports up to four channel modules

System Timing Considerations

The ***ETU02-MUX*** has the flexibility to meet the timing requirements of various system configurations. The timing mode for the E1 link and for the user channel are selected by the setting of configuration data via the front panel LCD display, terminal mode console port, or via option SNMP management port connection.

E1 link timing

The ***ETU02-MUX*** E1 link receive path always operates on the receive clock. The ***ETU02-MUX*** recovers the receive clock from the received E1 link data signal. The source of the ***ETU02-MUX*** E1 link transmit clock can be selected by the user.

The following E1 link transmit timing modes are available.

- **Loop back timing**:
  The ***ETU02-MUX*** E1 link transmit clock is locked to the recovered receive clock (Main link E1 or Sub link E1). This is usually the timing mode selected for network operation.
- **Internal timing**:
  The ***ETU02-MUX*** E1 link transmit clock is derived from the internal clock oscillator. This timing mode is necessary in point-to-point applications over leased line. In this case, one ***ETU02-MUX*** must use the internal oscillator, and the others must operate from the recovered clock.
- **External timing**:
  The ***ETU02-MUX*** E1 link transmit clock is locked to the clock signal provided by the user DCE connected to one of the user's data channels. When the data channel is used as the clock source, the data channel must use clock timing mode 2 (DTE1) or 4 (DTE3).

User data channel timing

The ***ETU02-MUX*** has four user data channel clocking modes:

- **Clock mode 1 (DCE)**:
  The ***ETU02-MUX*** data channel operates as a DCE and provides the transmit and receive clocks (recovered timing) to the data terminal equipment connected to the user channel. The clocks are locked to the master timing.
- **Clock mode 2 (DTE 1)**:
  The ***ETU02-MUX*** data channel operates as a DTE (crossover cable required) and supplies the receive clock to the synchronous DCE, and accepts a transmit clock from the DCE (from the ETC pin). The DCE must transmit data at the rate of the clock signal supplied by the ***ETU02-MUX***. This timing mode is also referred to as "transparent timing".
- **Clock mode 3 (DTE 2)**:
  The ***ETU02-MUX*** data channel operates as a DTE (crossover cable required) and accepts both transmit clock (from the ETC pin) and receive clock (from the ERC pin) from the user DCE equipment. **NOTE**: The X.21 data channel cannot be operated in clock timing mode 3 (DTE2).
- **Clock mode 4 (DTE 3)**:
  The ***ETU02-MUX*** data channel operates as a DTE (crossover cable required) and accepts both transmit clock and receive clock (both from the ETC pin) from the user DCE equipment.

1-6. TECHNICAL SPECIFICATIONS

Main link E1 and sub link E1

Framing	-Unframed/Framed (sub link framed only) -CCS (PCM31)/CAS (PCM30) -CRC4 ON/OFF
Bit Rate	2.048 Mbps
Line Code	-AMI -HDB3
Line Impedance	-Unbalanced 75 ohms -Balanced 120 ohms
Relative Receive Level	0 to -43dB
“Pulse” Amplitude	-Nominal 2.37V±10% for 75 ohms -Nominal 3.00V±10% for 120 ohms
“Zero” Amplitude	±0.1V
Transmit Frequency Tracking	
Internal Timing	±30 ppm
Loop back Timing	±50 ppm
External Timing	±100 ppm
Jitter Performance	According to ITU-T G.823
Complies With	ITU-T G.703, G.704, G.706 and G.732
Interface Connectors	-15-pin, D-type Female (AT&T pub 62411) (BD15 to USOC RJ48C adapter included) -BNC

User Data Channels

Interface Types	-V.35 -X.21 -RS-232 -RS-530/V.36 -RS-449 (via adapter cable) -G.703/64K Co-directional -NRZ -10/100Base-TX Bridge (ET100) -10/100Base-TX Router (ET100R)
Interface Connectors	
V.35 Interface	34 pin, Female
X.21 Interface	15 pin, D-type Female
RS-232 Interface	25 pin, D-type Female
RS-530 Interface	25 pin, D-type Female
RS-449 Interface	37 pin, D-type Male(via adapter cable)
G.704/64K I/F	15 pin, D-type Female
NRZ Interface	4, BNC Female
10Base-T Ethernet	RJ-45 Shielded
10/100Base-T Ethernet	RJ-45 Shielded
Line Code	NRZ (except G.603/64K and Ethernet)
Data Rate	n×56kbps or n×64kbps where n equal 1 to 31 in CCS and n equal 1 to 30 in CAS
Clock Modes	
Clock Mode 1 (DCE)	Receive and transmit clock (recovered) to the synchronous DTE
Clock Mode 2 (DTE1)	Receive clock to the synchronous, and transmit clock from the synchronous DCE device
Clock Mode 3 (DTE2)	Receive and transmit clock from the synchronous DCE (from ETC and ERC pin)
Clock Mode 4 (DTE3)	Receive and transmit clock from the synchronous DCE (all form ETC pin).
Control Signals	-CTS constantly ON or follows RTS -DSR constantly ON, except during test loops -DCD constantly ON, except during signal loss
Time slot allocation	User defined, randomly assignable

Setup/Configuration

LCD	2 rows of 16 characters
Pushbutton Switches	-Menu/ESC -Left Arrow -Right Arrow -Enter
Password Protection	user settable 4 character password

LED indicators

PWR	Green	Power
Signal Loss	Red	E1 link signal loss
Sync Loss	Red	E1 link sync loss
Alarm	Red	E1 link alarm, includes: BPV error / CRC4 error / Frame slip / All ones (AIS) / Remote alarm
Signal Loss	Red	Sub-E1 link signal loss
Sync Loss	Red	Sub-E1 link sync loss
Alarm	Red	Sub-E1 link alarm, includes: BPV error / CRC4 error / Frame slip / All ones(AIS) / Remote alarm
CH1~CH4	Yellow	RD/TD activity indicators for Data Channels
Test Error	Red	Bit errors
Test	Red	Unit in Loop back or pattern test

Diagnostic tests

Test loops
-Main link local analog loop back
-Main link local digital loop back
-Main link local payload loop back
-Main link remote analog loop back
-Main link remote payload loop back
-Sub link local analog loop back
-Sub link local digital loop back
-Sub link remote loop back
-Data channel (1-4) local analog loop back
-Data channel (1-4) local digital loop back
-Data channel (1-4) V.54 loop back

BERT test pattern
-511
-2047
-2^15-1
-2^20-1
-QRSS
-2^23-1
-All ones
-All zeros
-ALT
-Double ALT (11001100….)
-3 in 24
-1 in 16
-1 in 8
-1 in 4

RS-232/Alarm port

Port interface	V.24/RS-232 asynchronous, DCE
Port connector	9 pin D-type female
Data rate (*default)	300, 1200, 2400, 4800, 9600*, and 19200 bps
Data format	-One start bit -8 data bits -No parity -One stop bits
Alarm relay	-Floating pair of NO and NC contacts -Contact ratings: 1A at 30 VDC resistive or 0.5A at 125 VAC resistive

Physical

Height:	45 mm (1.75")
Width:	438 mm (17.25")
Depth:	233 mm (9.17")
Weight:	3.5 kg

Power supply

Voltage (AC model)	90 ~ 250 VAC
Voltage (DC model)	18 ~ 72 VDC
Voltages (DP model)	90 ~ 250 VAC + 18 ~ 72 VDC
Frequency	47 to 63 Hz for AC power
Power consumption	15 Watts

Environment

Temperature	0-50°C / 32-122°F
Humidity	0 to 90% non-condensing

Chapter 2. Installation

2-1. General

This chapter provides detailed instructions for mechanical installation of the ***ETU02–MUX***. Following the completion of installation, please refer to Chapter 3 for front panel operating information and Chapter 4 for console port operating information.

2-2. Site Preparation

Install the ***ETU02–MUX*** within reach of an easily accessible grounded AC outlet. The outlet should be capable of furnishing 90 to 250 VAC. Allow at least 10cm (4 inch) clearance at the rear of the ***ETU02–MUX*** for signal lines and interface cables.

2-3. Mechanical Assembly

The ***ETU02–MUX*** is designed for tabletop, shelf or rack mount installation, and except for rack mount installation, is delivered completely assembled. Rack mounted applications require installation of additional rack mounting “ears”. No provisions are made for bolting the ***ETU02–MUX*** to the tabletop.

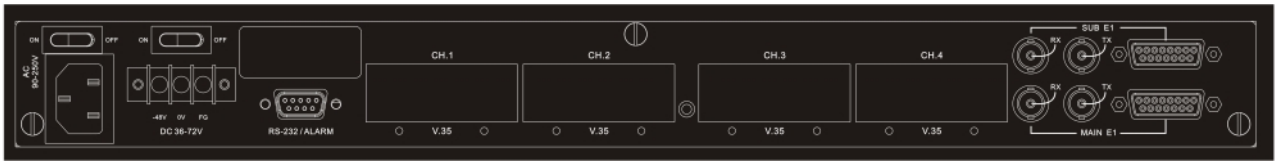
2-4. Electrical Installation

2-4-1. Power connection

AC power is supplied to the ***ETU02–MUX*** through a standard IEC 3-prong plug. (Refer to Figure 2-1) The ***ETU02–MUX*** should always be grounded through the protective earth lead of the power cable.

2-4-2. Rear panel connectors

The data channel module interfaces install into the rear panel from inside the ***ETU02–MUX*** (Refer to Figure 2-1) and consist of a DB15pin connector for X.21 and G.703 64K, DB25pin connector for RS-530 and RS-232, 34-pin M34 connector for V.35, and 8 pin RJ-45 connectors for the Ethernet interfaces. The E1 line and E1 sub-link connectors incorporate a pair of DB15pin each and two pairs of BNC Coax connectors. (Appendix C provides detailed information for the various interface modules).



AC Input DC Input

Figure 2-1 ***ETU02–MUX*** rear panel

E1 Line side

DB-15 Connector

The pin assignment for DB-15 connector follows AT&T Pub. 62411 as follows:

Pin:	Function:
1	TTIP (Transmit data out)
9	TRING (Transmit data out)
3	RTIP (Receive data in)
11	RRING (Receive data in)

BNC coax connector

Two BNC coax connectors marked RX and TX (Same function as the E1 line DB15 connector), provide unbalanced 75 Ohm connections for the E1 line.

DB15 to RJ-45 adapter, RJ-45 connector

When E1 connection requires RJ-45 physical connection, the DB15 to RJ-45 adapter provides the standard USOC RJ-48C pin assignment for the E1 connections. (Pin 1 = RRING, Pin 2 = RTIP, Pin 4 = TRING, & Pin 5 = TTIP)

Cable and Termination

Use a shielded twisted pair cable between the ***ETU02-MUX*** and the DTE device. The receivers on the ***ETU02-MUX*** are 100 Ohm terminated (For X.21 and RS-530). If problems are encountered with the connection to the DTE interface, make sure that the DTE interface is terminated correctly.

2-5. DIP Switch Setting and DATA Interface Module Replacement

2-5-1. Caution

To avoid accidental electric shock, disconnect the ***ETU02-MUX*** power cord before opening the cover. Access inside the equipment is permitted to authorized and qualified service personnel only.

2-5-2. Procedure

a. Turn power OFF. Disconnect the power cord from the AC outlet.
b. Loosen the captive thumb screws on the left and right sides of the rear panel.
c. Slide the outer housing forward or slide the main PCB assembly back to reveal the main PCB and data modules.
d. Adjust the DIP switches as required, according to table 2-1. (Appendix A describes the DIP switch functions).
e. With the exception of the V.35 module, remove the two flat-head screws on the exterior (rear panel) portion of the Channel Module.
f. Channel module PCB assemblies are secured with three Philips Head machine screws. The main PC board designations CN9, CN8, CN7 and CN6 correspond to Data Port modules 1, 2, 3 and 4 respectively. Remove the screws and carefully lift the module off the internal 32 pin connector. Install a module with the reverse procedure, taking care to properly align the pins, seat the board, and apply the three screws. Visually check that all pins are seated and that none are bent.
g. Slide the main PCB assembly back into the outer housing and tighten the thumb screws.

Table 2-1

Item	**Function**	**Possible Settings**	**Switch Designation**	**Factory Setting**
1	Reserved	On / Off	DSW1- 1	Off
2	Reserved	On / Off	DSW1- 2	Off
3	Reserved	On / Off	DSW1- 3	Off
4	Reserved	On / Off	DSW1- 4	Off
5	Reserved	On / Off	DSW1- 5	Off
7	Main E1 Impedance	All On=75Ω, All Off=120Ω	DSW2- 1~5	All Off
8	Sub E1 Impedance	All On=75Ω, All Off=120Ω	SW1- 1~5*	All Off
9	Frame ground	DIS: Not Connected to signal ground CON: Connected to signal ground	CHASS1	DIS

DSW1 and DSW2 are located on the main PC Board.

*Switch SW1 is located on the Sub E1 Interface card.

Chassis GND Jumper

Set this jumper to "CON" to connect logic ground to chassis. Set to "DIS" to separate logic and chassis grounds.

Please refer to the following figure for location of DIP switch and chassis jumper.

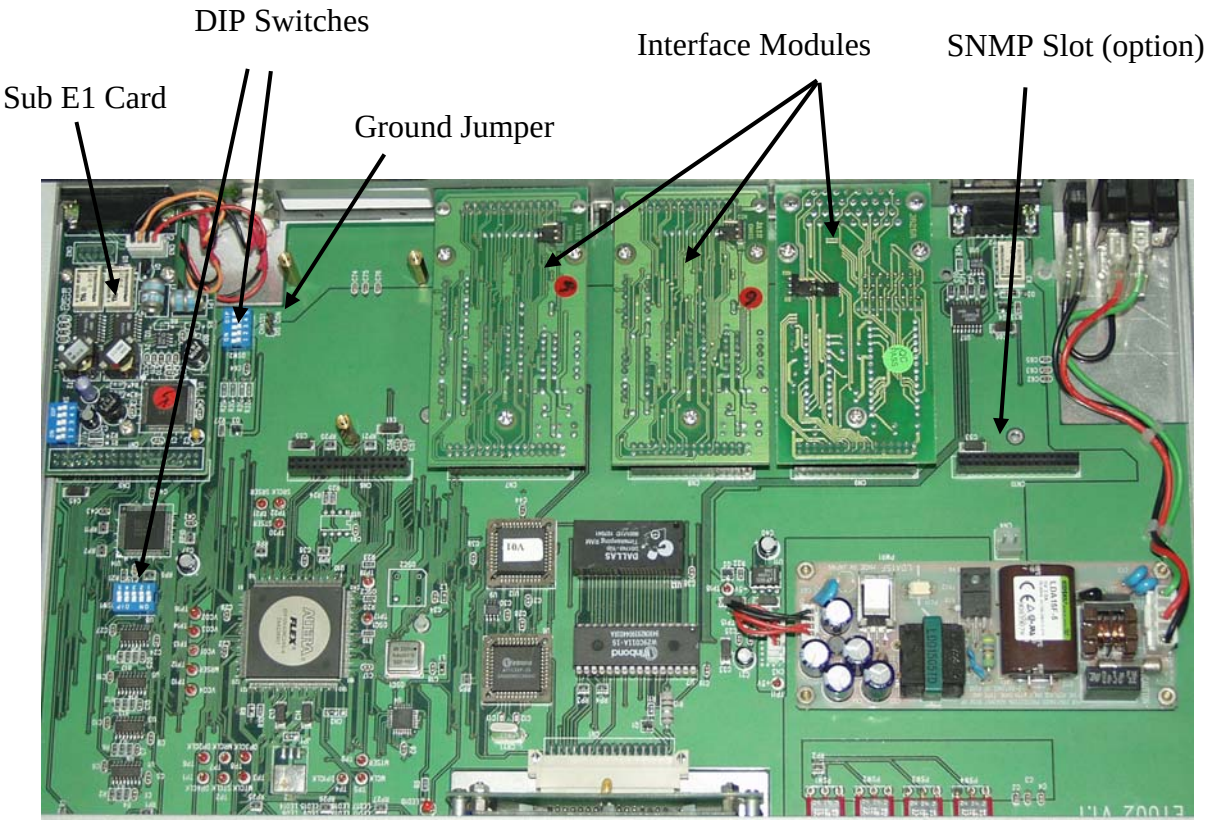


Figure 2-2 : ***ETU02-MUX*** Main PCB Assembly

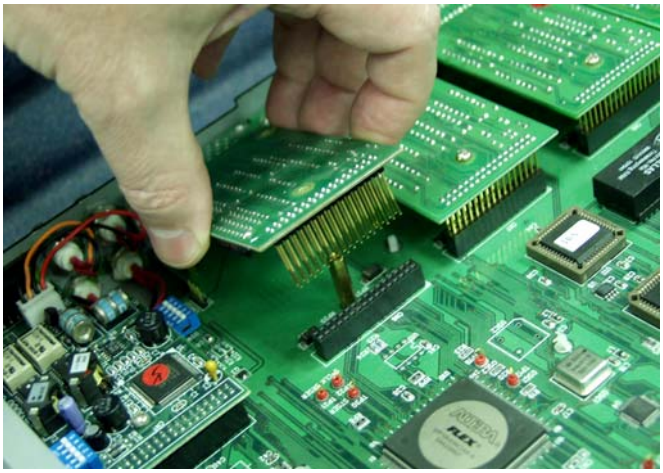


Figure 2-3. Interface Module Insertion/removal

Chapter 3. Front Panel Operation

3-1. General

This chapter describes the ***ETU02-MUX*** controls and indicators, and explains operation setup procedures using the front panel LCD and menu keys. Installation procedures (in Chapter 2) must be completed and checked before attempting to operate the ***ETU02-MUX***.

3-2. Controls and Indicators

All controls (push-button switches), LCD display and LED indicators are located on the ***ETU02-MUX*** front panel. The momentary on pushbutton switches are used to activate menu selections and select parameter settings.

Figure 3-1 ***ETU02-MUX*** Front Panel

Use the '<' and '>' function keys to browse the menus and select parameters.
Use the '**Menu/ESC**' function key to return to a previous menu or to abandon setup.
Use the '**Enter**' function key to set a parameter of a selection or to enter a sub-menu.

3-3 Menu Operation

3.3.1 Top Level Menus The following are the 12 top level Menus. Press an arrow key to select another top level Menu or press ENTER to reach a sub menu.

```
< ADMINISTRATION >
  LOGIN  PWD: 0 _ _ _
```

If a login password is set, this will be the first greeting screen. (Factory default has no password.)

If a password is not set, the following will be the greeting screen.

```
<   SYSTEM              >
    PARAMETER
```

Set the Master and Fallback timing.

```
<   MAIN  LINK          >
    PARAMETER
```

Set the Frame type, CRC mode, idle code, Line code and RAI for main E1 link.

```
<   SUB  LINK           >
    PARAMETER
```

Set the Frame type, CRC mode, idle code, Line code and RAI for E1 sub-link.

```
<   TIME  SLOT          >
      MAPPING
```

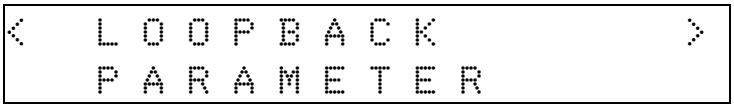
Assign the E1 timeslots to the Data Channels and/or E1 sub-link.

```
<   DATA  PORT          >
    PARAMETER
```

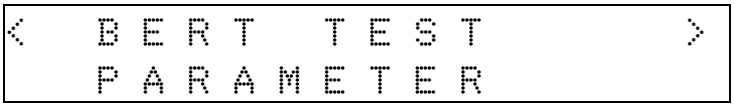
Data Port Informational screen and settings for Clock Mode, Handshaking, and multiplier (n56K or n64K).

```
<   CONTROL  PORT       >
    PARAMETER
```

Setup for the terminal console port. Default is 9600, 8bit, no parity. Only the baud rate is selectable.

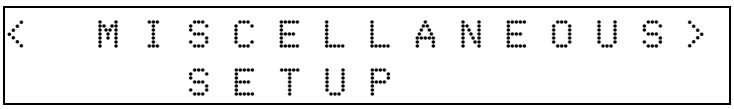


Enable main link, sub-link, or data channel Loop back.

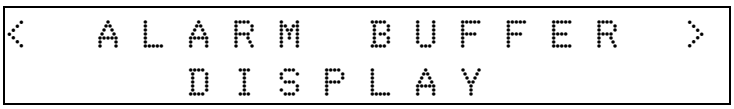


Enable BERT, select channel, select pattern, and do error insertion.

Display and set the internal real time clock of the ***ETU02-MUX***.



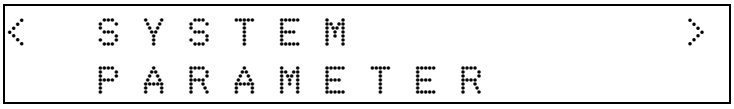
Set the mode of the LCD backlight either Off, On, or Auto.



Display the Alarm Buffer.

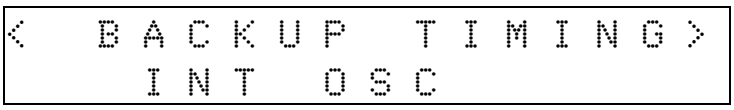
Display the performance registers.

3.3.2 System Parameter Detail The following screens show the setup screens under the System Parameter Main Screen.



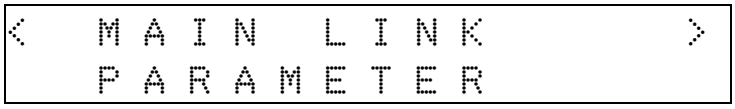
Press ENTER, MASTER TIMING sub-menu will be displayed. Master Timing sets the source for the timing in the ***ETU02-MUX***.

Pressing ENTER again will place the cursors on the parameter selection line. The arrow keys are now used to browse the available parameters. Available parameters under Master Timing are:
MAIN LINK; Timing is recovered from the main E1 link.
SUB LINK; Timing is recovered from the E1 sub-link.
INT OSC; Timing is provided by the internal oscillator of the ***ETU02-MUX***.
CH 1 LINK; Timing is recovered from the Data Channel 1.
CH 2 LINK; Timing is recovered from the Data Channel 2.
CH 3 LINK; Timing is recovered from the Data Channel 3.
CH 4 LINK; Timing is recovered from the Data Channel 4.
Press the ENTER key on the selected parameter. The cursors will return to the top line. Use the RIGHT arrow key to select the next sub-menu (BACKUP TIMING). The settings of backup timing are used as a "fallback" in case the main timing sync is lost. A typical setting for the backup timing would be the choice of internal oscillator.

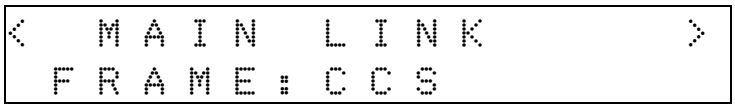


Pressing ENTER will place the cursors on the parameter selection line. The arrow keys may now be used to browse the available parameters. Available parameters under Backup Timing are:
MAIN LINK; Timing is recovered from the main E1 link.
SUB LINK; Timing is recovered from the E1 sub-link.
INT OSC; Timing is provided by the internal oscillator of the ***ETU02-MUX***.

3.3.3 Main Link Parameter Detail The following screens show the setup screens under the Main Link Parameter Screen.



Press ENTER and the MAIN LINK sub-menu will be displayed. Main Link sets the frame type, CRC mode, idle code, Line Code and RAI state for the main E1 link of the ***ETU02-MUX***.



Use the arrow keys to browse the individual link parameters (frame, CRC, etc.). Press ENTER on the parameter to select it with the cursors. Now use the arrow keys to browse the available settings for that parameter. The following is a breakdown of parameters and available settings:

FRAME; CCS, CAS, or UNFRAME, CCS default.

CRC-4; OFF or ON, OFF default.

IDLE CODE; any hex code from 00 to FF, 7E default.

RAI; (Remote Alarm Indicator) DISABLE or ENABLE, DISABLE default.

LINE CODE; HDB3 or AMI, HDB3 default.

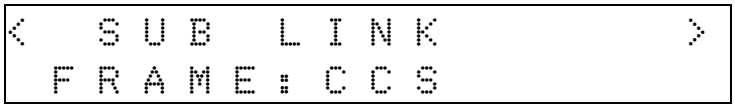
IMPEDANCE; will display current setting depending upon the internal DIP switch settings.

RMT LOOP; OFF or ON, OFF default. Will place remote unit into loop back.

For transmission of unframed data, select UNFRAME for the main E1 link. In this case, all the Data Ports except CH1 are disabled (the data rate of CH1 is automatically set to 2.048 Mbps).

3.3.4 Sub Link Parameter Detail The following screens show the setup screens under the Sub Link Parameter Screen.

Press ENTER and the SUB LINK sub-menu will be displayed. Sub Link sets the frame type, CRC mode, idle code, Line Code and RAI state for the E1 sub-link of the ***ETU02-MUX***.



The parameters and settings for the E1 sub-link are the same as for the Main Link above.

3.3.5 Timeslot Mapping Detail The following screen is an example of Timeslot Mapping.

```
<   TIME  SLOT      >
     MAPPING
```

Press ENTER.

```
F 1 1 1 1 1 1 1 2 2 2 2 2 2 2 2
3 3 3 3 3 3 3 3 4 4 4 4 4 4 4 4
```

The E1 frame is shown with 32 timeslots, top row left to right are TS0-15, while the bottom row displays the settings for TS16-31. Press ENTER to move to the next TS, use the arrow keys to assign the timeslot as follows:

F = Framing (CCS/CAS) always on TS 00
S = Signaling (CAS) always on TS 16
N = not assigned
1 = Data Channel 1
2 = Data Channel 2
3 = Data Channel 3
4 = Data Channel 4
D = Data on E1 sub-link
V = Voice on E1 sub-link

TS 00:Cannot be assigned in CCS or CAS mode of MAIN LINK to anything but Framing.
TS 16:Cannot be assigned in CAS mode of MAIN LINK to anything but Signaling.

3.3.6 Data Port Parameter Detail The following shows the setup screens under the Data Port Parameter Screen.

```
<   DATA  PORT      >
    PARAMETER
```

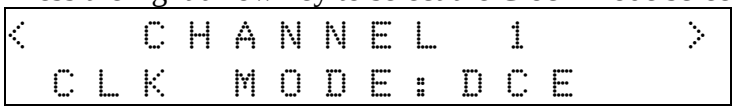
Press ENTER

```
< CH1: V.35    DCE  >
    N64    448Kbps
```

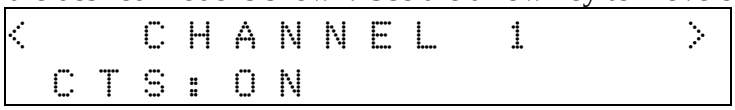
Use the arrow keys to display information for the other Data Port channels. The first line shows the port number followed by the interface type and clock mode. The second line shows that channel's multiplier value (56k or 64k) and the bandwidth used by the channel. In the above display, channel 1 is using a V.35 interface, clock mode set to DCE, 64k multiplier and 448kbps bandwidth.

While in the Data Port display, only the clock mode, handshaking, multiplier and clock polarity values are user settable. The interface type is auto-detected and the data bandwidth is calculated by multiplying the multiplier value times the number of timeslots assigned to the channel under the Timeslot Mapping screen. Pressing ENTER again will bring up the individual Data Port channel display.

Use the arrow keys to browse the available settings under the Data Port channel. They are:
Multiplier value; N64 or N56, default is N64
Clock mode; DCE, DTE1, DTE2, DTE3, default is DCE
CTS; ON or RTS, default is ON
TC OUT; NORMAL or INVERT, sets the polarity of the Transmit Clock
RC OUT; NORMAL or INVERT, sets the polarity of the Receive Clock
Press the ENTER key to move the cursors to the Multiplier field. Select either N64 or N56 using the arrow keys, then press ENTER.
Press the right arrow key to select the Clock Mode screen.

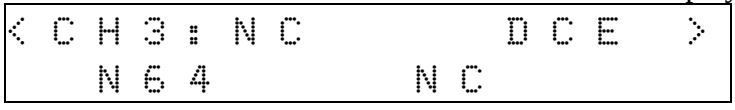


Press ENTER and use the arrow keys to browse the settings for CLK MODE. Press ENTER when the desired mode is shown. Use the arrow key to move on to the last parameter setting for CTS.



Press ENTER to move the cursors to the CTS field. Select either ON or RTS using the arrow keys, then press ENTER. Press the MENU/ESC key to back out of the Channel 1 settings. Use the arrow key to select the other Channels and follow the same procedure to set multiplier, clock mode, handshaking and clock polarity settings.

If the Data Port channel module in not installed a display similar to the following will be displayed.



3.3.7 Control Port Parameter Detail The following shows the setup screens under the Control Port Parameter Screen.

```
<   CONTROL  PORT   >
    PARAMETER
```

Press ENTER

```
    CONTROL  PORT
 9600bps  8  NONE
```

This screen shows the default settings for the Control Port.

Only the speed parameter is settable for the Control Port.
Speed; 300, 600, 1200, 2400, 4800, 9600, and 19200, default is 9600.
Data Length; fixed at 8 bits only.
Parity; fixed at NONE only.

Follow the normal screen procedures to set the speed parameter, then press MENU/ESC to return to the top menu.

3.3.8 Loop back Parameter Detail The following show the setup screens under the Loop back Parameter Screen.

```
<   LOOPBACK        >
    PARAMETER
```

Press ENTER

```
<   MAIN  LINK      >
  LOOPBACK  OFF
```

Use the arrow keys to browse the available options for loop back setting. By default, all loop backs are off. The details are as follows:
Main Link; Loop back Off, Local Analog, Local Digital, Local Payload, Remote Analog, or Remote Payload
Sub Link; Loop back Off, Local Analog, Local Digital, or Remote Loop
Channel 1; Loop back Off, Local Analog, Local Digital, or V.54 Loop
Channel 2; Loop back Off, Local Analog, Local Digital, or V.54 Loop
Channel 3; Loop back Off, Local Analog, Local Digital, or V.54 Loop
Channel 4; Loop back Off, Local Analog, Local Digital, or V.54 Loop
All Channels; use this option to quickly turn loop back Off for all channels.

3.3.9 BERT Test Detail The following show the setup screens under the BERT test Parameter Screen.

```
<   BERT  TEST      >
    PARAMETER
```

Press ENTER

```
<   BERT  TEST      >
  FUNCTION:OFF
```

Use the arrow keys to browse the available options for BERT test setting. The details are as follows:

Function; Off or On, default Off. Use to start BERT.

Channel; Ch1, Ch2, Ch3, Ch4, SL-ML (sub-link/main-link), or SL-SL, default is Ch1

Pattern; 511, 2047, 2e15-1, 2e20-1, QRSS, 2e23-1, All 1, All 0, Alt, 0011, 3in24, 1in16, 1in8, or 1in4, default is 511

Err Ins; NONE, Single,10e-1, 10e-2, 10e-3, 10e-4, 10e-5, 10e-6, or 10e-7, default is NONE

Result; display the received bit errors and error rate.

BERT TEST ERROR INSERT (SINGLE)

```
    BERT  TEST
<ERR  INS:SINGLE>
```

When selecting the Single Error insert the following screen will display.

```
BERT  SINGLE  ERR.
INSERT  [  ENTER  ]
```

Press ENTER each time you want to insert an error.

3.3.10 Date & Time Display & Set Detail The following shows the setup screens under the Date & Time Parameter Screen.

```
<   DATE  &  TIME    >
    DISPLAY  &  SET
```

Press ENTER to display current Date and Time.

```
DATE   1999/03/01
TIME      00:00:08
```

Press ENTER again to define date and time. The cursor will be in the year field. Use the arrow keys to increment or decrement the year. Press ENTER to save and move on to the month field. Use the arrow keys again to change the month, press ENTER to save and move to the Day field. Continue this procedure for the time settings and then press MENU/ESC to start the clock from the set time. The clock used in the ***ETU02-MUX*** is fully Y2K compliant.

```
DATE   2007/06/27
TIME      14:13:15
```

3.3.11 Miscellaneous Setup Detail The following shows the setup screens under the Miscellaneous Parameter Screen.

```
<   MISCELLANEOUS>
      SETUP
```

Press ENTER.

```
<   MISCELLANEOUS>
  LCD  LIGHT: AUTO
```

Use the arrow keys to browse the available options for the LCD back lighting. They are:

AUTO; The backlight will automatically turn off in 5 minutes if no key is pressed. The backlight will automatically turn on again if any key is pressed. Default is AUTO.

ON; The backlight will remain permanently on.

OFF; The backlight will remain permanently off.

Follow the normal menu procedures. From the Miscellaneous Setup menu use the arrow keys to browse to the RESET TO DEFAULT parameter function.

```
<   MISCELLANEOUS>
RESET   TO   DEFAULT
```

Press ENTER.

```
RESET   TO   DEFAULT
  PRESS   [ENTER]
```

Press the ENTER key to completely reset all parameters to their original factory defaults.

Follow the normal menu procedures. From the Miscellaneous Setup menu use the arrow keys to browse to the Modify PWD (password) function. (This feature added in f/w version 1.42.) Any password value entered from 0001 to 9999 is valid. 0000 will disable the password.

```
<   MISCELLANEOUS>
    MODIFY   PWD
```

Press Enter.

```
<   Modify   PWD      >
  INPUT   PWD: 0___
```

Use right arrow to increase, left arrow to decrease value, 0~9

```
    Modify   PWD
< INPUT   PWD: 3___ >
```

Press Enter. Use right arrow to increase, left arrow to decrease value, 0~9.

```
    Modify   PWD
< INPUT   PWD: 30__ >
```

Continue until four digits are entered. Then repeat again for the password check.

```
<   Modify   PWD      >
  Check   PWD: 0___
```

If the two entered passwords match, it will be accepted.

```
<   Modify   PWD      >
Password   Correct
```

To clear the password, enter the value 0000 twice.

```
<   Modify   PWD      >
Password   DISABLE
```

3.3.12 Alarm Buffer Display Detail Use this function to display and/or clear the Alarm Buffer.

```
<   ALARM  BUFFER   >
      DISPLAY
```

Use the arrow keys to select between DISPLAY and CLEAR. To display press ENTER.

```
<   DISPLAY  ALARM >
      BUFFER
```

Press ENTER to display buffer. Refer to Table 5-2 in Chapter 5 TEST and DIAGNOSTICS, for the meaning of the displayed alarms.

If you use the arrow keys to browse to the CLEAR function, the following will be displayed.

```
<   CLEAR  ALARM     >
  BUFFER  [ENTER]
```

Press ENTER to clear the alarm buffer or press Menu/ESC to exit.

3.3.13 Performance Monitor Display Detail Use this function to display and/or clear the Performance Data.

```
<   PERFORMANCE      >
      DISPLAY
```

The Performance Display is used to show the CRC-4 (checksum) count (CRC4 Cnt) or Bipolar Violations (BPV) count, Current Error Seconds (CURR ES), Current Unavailable Seconds (CURR UAS), Long Term Errored Seconds (LONG ES), Long Term Unavailable Seconds (LONG UAS), Current Seconds (CURR SEC) and Long Seconds (LONG SEC). Refer to Appendix B, for the detailed meaning of the performance displays. Press ENTER.

Press ENTER and use the arrow keys to select between Main Link, Sub Link and CLEAR.

```
<   PERFORMANCE      >
  MAIN  LINK  DISP
```

Press the arrow keys to browse the error counts for CRC4 Cnt, CURR ES, CURR UAS, etc. To exit the performance display, press ESC. To clear the data registers, press ENTER on the Reset page.

Refer to Table 5-3 in Chapter 5 TEST and DIAGNOSTICS, for the meaning of the performance messages.

This completes the detailed discussion of the function setup of the ***ETU02-MUX*** via the front panel LCD display.

Chapter 4. Console Port Operation

4-1 General

The ***ETU02-MUX*** ConsolePort (labeled RS-232/Alarm on the rear panel) is a serial terminal port designed to facilitate setup of all parameters through the use of a standard text based terminal or any terminal emulation program running on a Personal Computer.

4-2 Terminal Connection

A notebook computer has become an invaluable tool of the Systems Engineer. Connection to the computer is very straight forward. The only other hardware required is a DB9-pin one-to-one, male to female cable. The ***ETU02-MUX*** acts as a DCE to the PC's DTE communications port. A convenient application, provided with the Microsoft Windows® 98/NT/2K operating systems, is "HyperTerminal™". Set the properties to match the ***ETU02-MUX*** control port defaults as follows: Baud=9600, Data bits=8, Parity=None, Stop bits=1, and handshaking =none. Make the appropriate connections, start the terminal application, apply power to the ***ETU02-MUX***, then press ENTER on the PC keyboard. If you are using "HyperTerminal™" the display should look like the following.

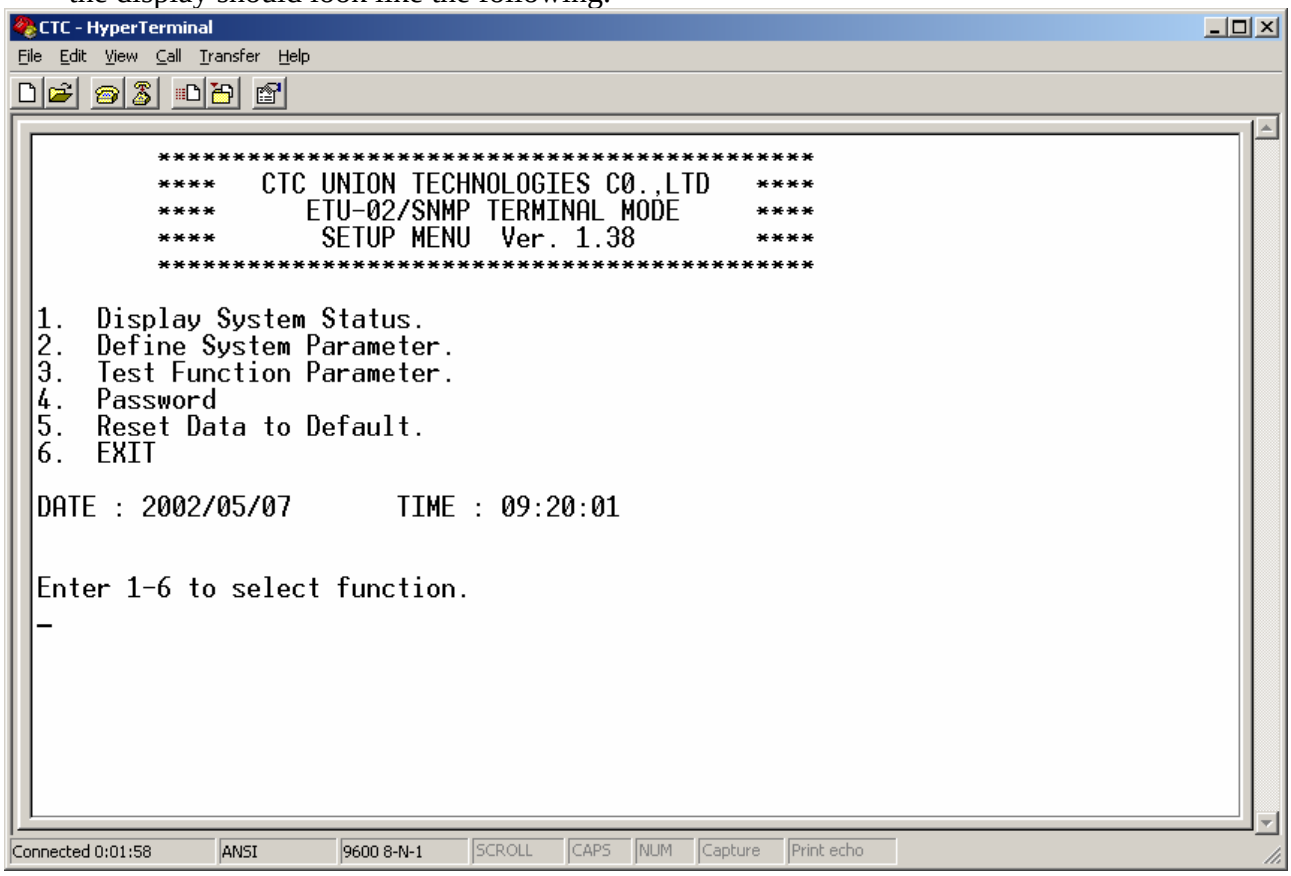
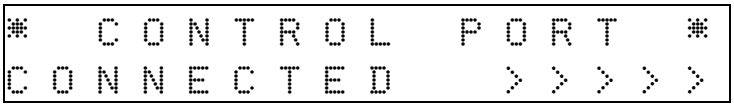


Figure 4-1. Example of terminal display

Note: When a terminal connection is made to the ***ETU02-MUX***, the front panel LCD will be locked out and display.



4-3 Menu System Detail

The menu systems are displayed in the same order and with the same parameters as those in the LCD display. The following section will detail actual displays with descriptions of parameter settings via relevant key commands.

This is the first screen seen after connecting. Note that the first two items, Display and define deal with all the system settings. The Display item will browse settings for viewing only, while under Define, all parameters may be both viewed and changed.

```
*******************************************
****   CTC UNION TECHNOLOGIES CO.,LTD   ****
****      ETU-02/SNMP TERMINAL MODE     ****
****       SETUP MENU  Ver. 1.38        ****
*******************************************

1.  Display System Status.
2.  Define System Parameter.
3.  Test Function Parameter.
4.  Password
5.  Reset Data to Default.
6.  EXIT

DATE : 2002/05/07 TIME : 09:20:01


Enter 1-6 to select function.
```

Enter 1 to enter the Display System Status menu.

```
  <<  Display System Status  >>

1.  Timing
2.  Main Link
3.  Sub Link
4.  Time Slot
5.  Data Port
6.  Control Port
7.  Alarm Buffer
8.  BERT Test Result
9.  Performance
A.  SNMP Agent Information
B.  ETU-02 Information


Enter 1-B or Press "ESC" to previous menu.
```

Enter 1 to display the Timing Parameters.

```
  <<  Display Timing Parameter  >>

Master Timing : MAIN LINK
BacK Timing   :  INT OSC

Press "ESC" to previous menu.
```

The display shows that the Master Timing is derived from the main E1 link, while the fallback timing, if required, will be derived from the internal oscillator. To exit this menu to the previous one, Enter ESC.

```
  <<  Display System Status  >>

1.  Timing
2.  Main Link
3.  Sub Link
4.  Time Slot
5.  Data Port
6.  Control Port
7.  Alarm Buffer
8.  BERT Test Result
9.  Performance
A.  SNMP Agent Information
B.  ETU-02 Information

Enter 1-B or Press "ESC" to previous menu.
```

Enter 2 to display the settings for the main E1 link.

```
  <<  Display Main Link Parameter  >>

Frame      : CCS
CRC-4      : OFF
Idle Code  : 7E
RAI        : DISABLE
Line Code  : HDB3
Impedance  : 120 ohm

Remote Loop: OFF

Press "ESC" to previous menu.
```

The above display shows the settings for Frame type, CRC setting, Idle code, RAI setting, Line Code and E1 interface impedance for the main E1 link. To return to the previous display, enter ESC.

```
  <<  Display System Status  >>

1.  Timing
2.  Main Link
3.  Sub Link
4.  Time Slot
5.  Data Port
6.  Control Port
7.  Alarm Buffer
8.  BERT Test Result
9.  Performance
A.  SNMP Agent Information
B.  ETU-02 Information

Enter 1-B or Press "ESC" to previous menu.
```

To display the parameter settings for the E1 sub-link, enter 3.

```
  <<  Display Sub Link Parameter  >>

Frame      : CCS
CRC-4      : OFF
Idle Code  : 7E
RAI        : DISABLE
Line Code  : HDB3
Impedance  : 120 ohm
Remote Loop: OFF

Press "ESC" to previous menu.
```

This display has shown the settings for Frame type, CRC setting, Idle code, RAI setting, Line Code and E1 interface impedance for the E1 sub-link. To return to the previous display, enter ESC.

To display the Time Slot mapping details, enter 4.

```
  <<  Display Time Slot Mapping  >>

SLOT : 00   01  02  03  04  05  06  07
TYPE : Fr   C1  C1  C1  C1  C1  C1  C1

SLOT : 08   09  10  11  12  13  14  15
TYPE : C2   C2  C2  C2  C2  C2  C2  C2

SLOT : 16   17  18  19  20  21  22  23
TYPE : C3   C3  C3  C3  C3  C3  C3  C3

SLOT : 24   25  26  27  28  29  30  31
TYPE : C4   C4  C4  C4  C4  C4  C4  C4

NC: No define                C(1~4): Channel (1~4)
SD: Sub Link Data            SV: Sub Link Voice
Fr: Framing                  Si: Signaling

Press "ESC" to previous menu.
```

The Time Slot mapping display shows the assignments for all of the 32 timeslots of the E1 frame. All timeslots 0~31 are shown with the assigned abbreviations shown directly beneath. To return to the previous display, enter ESC.

To display the Data Port parameter settings for each channel module, enter 5.

```
  <<  Display Data Port Parameter  >>

PORT TYPE   CLOCK  MULTI  CTS   SPEED    TC     RC
1    V.35   DCE    N64    ON   448Kbps  NORMAL NORMAL
2    V.35   DCE    N64    ON   512Kbps  NORMAL NORMAL
3    V.35   DCE    N64    ON   512Kbps  NORMAL NORMAL
4    V.35   DCE    N64    ON   512Kbps  NORMAL NORMAL

Press "ESC" to previous menu.
```

Enter ESC to return to the Display System Status menu.

Enter 6 to display the Control Port settings.

```
  <<  Display Control Port Parameter  >>

SPEED : 9600bps
DATA  : 8
PARITY: NONE

Press "ESC" to previous menu.
```

The display shows the current settings. To return to the main display press ESC.

Enter 9 to display the Performance data of the ETU-02.

```
    <<  Display E1 Link Performance  >>

---------- Main Link Performance ----------
Current CRC-4 error count : 0
Current errored seconds (ES) : 0
Current unavailable seconds (UAS) : 0
Long term errored seconds (ES) : 0
Long term fail seconds (UAS) : 0

---------- Sub Link Performance ----------
Current CRC-4 error count : 0
Current errored seconds (ES) : 0
Current unavailable seconds (UAS) : 0
Long term errored seconds (ES) : 0
Long term fail seconds (UAS) : 0

Current seconds : 766
Long term seconds : 2

Press "ESC" to previous menu or "SPACE" to review,
"Enter" to clear.
```

The performance data is listed for both main and sub E1 links. To return to the main display press ESC.

Enter A to display the SNMP agent information.

```
<<  SNMP Card Information  >>


Local IP Address :      <192.168.0.233>
Gateway IP Address :    <192.168.0.254>
Subnet Mask Address :   <255.255.255.0>
Community String :      <Public>

Agent IP Address :      <192.168.0.74>
Access Permission :     <Read/Write>

Receiver IP Address :   <192.168.0.74>
Severity Status :       <Information>

Hardware Address :      <01-02-03-04-00-00>


Press "ESC" to previous menu.
```

Enter B to display the ETU02 Information screen.

```
  <<  Display ETU-02 Information  >>

EPLD Version : 01
FPGA Version : 06

DATE : 2002/05/07  TIME : 09:22:21

Press "ESC" to previous menu.
```

The information displayed shows the hardware version numbers of the EPLD and FPGA chips in the ETU-02. To exit this display, press ESC. Then press ESC again to go to the very top menu display.

```
*****************************************
****   CTC UNION TECHNOLOGIES CO.,LTD   ****
****      ETU-02/SNMP TERMINAL MODE     ****
****       SETUP MENU  Ver. 1.38        ****
*****************************************

1.  Display System Status.
2.  Define System Parameter.
3.  Test Function Parameter.
4.  Password
5.  Reset Data to Default.
6.  EXIT

DATE : 2002/05/07 TIME : 09:25:01


Enter 1-6 to select function.
```

Now we will look at setting up the system parameters. To do this enter 2.

```
  <<  Define System Parameter  >>


1.  Timing
2.  Main Link
3.  Sub Link
4.  Time Slot
5.  Data Port
6.  Date & Time
7.  SNMP Agent Setup


Enter 1-7 or Press "ESC" to previous menu.
```

The first selection of system parameters is the Timing parameter, so let's enter 1.

```
  <<  Define Timing Parameter  >>

1.  Master Timing
2.  Back Timing



Enter 1-2 or Press "ESC" to previous menu.
```

There are two timing parameters that can be setup. The "Master Timing" provides the clock source for the ***ETU02-MUX*** . If that timing source should fail, a second "Backup Timing" source will be used. Normally, the backup timing would be set to the ***ETU02-MUX's*** internal oscillator.

To define the master timing, enter 1.

```
  <<  Define Master Timing Parameter  >>

Master Timing : MAIN LINK

1.  Main Link
2.  Sub Link
3.  INT OSC
4.  Channel 1
5.  Channel 2
6.  Channel 3
7.  Channel 4

Enter 1-7 or Press "ESC" to previous menu.
```

The display shows that the master timing is currently derived from the Main link. To change, select one of the appropriate choices from 1~7 or to exit without changing press ESC.

```
  <<  Define Timing Parameter  >>

1.  Master Timing
2.  Back Timing

Enter 1-2 or Press "ESC" to previous menu.
```

To define the fallback timing, enter 2.

```
  <<  Define Back Timing Parameter  >>

BacK Timing   :  INT OSC

1.  Main Link
2.  Sub Link
3.  INT OSC

Enter 1-3 or Press "ESC" to previous menu.
```

The display shows that the fallback timing is currently derived from the internal oscillator. To change, select one of the appropriate choices from 1~3 or to exit without changing press ESC.

```
  <<  Define Timing Parameter  >>

1.  Master Timing
2.  Back Timing

Enter 1-2 or Press "ESC" to previous menu.
```

Enter ESC to leave the Timing Parameter menu and return to Defining System Parameters.

```
  <<  Define System Parameter  >>


1.  Timing
2.  Main Link
3.  Sub Link
4.  Time Slot
5.  Data Port
6.  Date & Time
7.  SNMP Agent Setup


Enter 1-7 or Press "ESC" to previous menu.
```

To define system parameters for the main E1 link, enter 2.

```
  <<  Define Main Link Parameter  >>

1.  FRAME
2.  CRC-4
3.  IDLE CODE
4.  RAI
5.  LINE CODE
6.  REMOTE LOOP FUNCTION

Enter 1-6 or Press "ESC" to previous menu.
```

To define the Frame type for the main E1 link, press 1.

```
  <<  Define Main Link Frame Parameter  >>

Frame      : CCS

1.  CCS
2.  CAS
3.  UNFRAME


Enter 1-3 or Press "ESC" to previous menu.
```

The current frame type setting is CCS. To change it enter 1~3. To exit and leave the setting unchanged, press ESC.

```
  <<  Define Main Link Parameter  >>

1.  FRAME
2.  CRC-4
3.  IDLE CODE
4.  RAI
5.  LINE CODE
6.  REMOTE LOOP FUNCTION

Enter 1-6 or Press "ESC" to previous menu.
```

To enable or disable the CRC-4 setting, enter 2.

```
  <<  Define Main Link CRC-4 Parameter  >>

CRC-4      : OFF

1.  OFF
2.  ON


Enter 1-2 or Press "ESC" to previous menu.
```

The current setting for CRC-4 is Off. To turn on, press 2. To exit without changing, press ESC.

```
  <<  Define Main Link Parameter  >>

1.  FRAME
2.  CRC-4
3.  IDLE CODE
4.  RAI
5.  LINE CODE
6.  REMOTE LOOP FUNCTION

Enter 1-6 or Press "ESC" to previous menu.
```

To define the Idle code for the main E1 link, enter 3.

```
  <<  Define Main Link Idle Code  >>

Idle Code  : 7E


Enter Code (00~FF) :
```

Enter the new Idle code with the hex value 00~FF, or to exit, press ESC.

```
  <<  Define Main Link Parameter  >>

1.  FRAME
2.  CRC-4
3.  IDLE CODE
4.  RAI
5.  LINE CODE
6.  REMOTE LOOP FUNCTION

Enter 1-6 or Press "ESC" to previous menu.
```

To enable or disable the Remote Alarm Indicator, press 4.

```
  <<  Define Main Link RAI Parameter  >>

RAI        : DISABLE

1.  Disable
2.  Enable

Enter 1-2 or Press "ESC" to previous menu.
```

Press 1 to disable, 2 to enable RAI, or press ESC to exit without changing.

```
  <<  Define Main Link Parameter  >>

1.  FRAME
2.  CRC-4
3.  IDLE CODE
4.  RAI
5.  LINE CODE
6.  REMOTE LOOP FUNCTION

Enter 1-6 or Press "ESC" to previous menu.
```

To change the Line Code press 5.

```
  <<  Define Line Code Parameter  >>

1.  HDB3
2.  AMI

Enter 1-2 or Press "ESC" to previous menu.
```

Press 1 to define a Line Code of HDB3, press 2 to define a Line Code of AMI or press ESC to exit without saving.

```
  <<  Define Main Link Parameter  >>

1.  FRAME
2.  CRC-4
3.  IDLE CODE
4.  RAI
5.  LINE CODE
6.  REMOTE LOOP FUNCTION

Enter 1-6 or Press "ESC" to previous menu.
```

Press 6 to enter the main link Remote loop back function.

```
  <<  Define Remote Loopback Parameter  >>

Remote Loop: OFF

1.  OFF
2.  ON

Enter 1-2 or Press "ESC" to previous menu.
```

Press "2" to initiate a remote loop back of the main E1 link, press "1" to stop loop back, or press "ESC" to return to the previous menu without any change.

Press ESC again to return to the top of the System Define menu.

```
  <<  Define System Parameter  >>

1.  Timing
2.  Main Link
3.  Sub Link
4.  Time Slot
5.  Data Port
6.  Date & Time
7.  SNMP Agent Setup

Enter 1-7 or Press "ESC" to previous menu.
```

To define system parameters for the E1 sub-link, enter 3.

```
  <<  Define Sub Link Parameter  >>

1.  FRAME
2.  CRC-4
3.  IDLE CODE
4.  RAI
5.  LINE CODE

Enter 1-5 or Press "ESC" to previous menu.
```

As you can see, the parameters for sub-link are identical to the Main Link parameters, but without the "REMOTE LOOP FUNCTION".
Press ESC. Refer to the Main Link parameters as a guide for setting the sub-link.

```
  <<  Define System Parameter  >>

1.  Timing
2.  Main Link
3.  Sub Link
4.  Time Slot
5.  Data Port
6.  Date & Time
7.  SNMP Agent Setup

Enter 1-7 or Press "ESC" to previous menu.
```

To define the Timeslot mapping assignments, press 4.

```
  <<  Define Time Slot Mapping  >>

TIME SLOT 01
TYPE : Channel 1

1.  NC
2.  Channel 1
3.  Channel 2
4.  Channel 3
5.  Channel 4
6.  Sub Link Data
7.  Sub Link Voice

Enter 1-7 or Press "ENTER" to next Time Slot or "ESC"
to previous menu.
```

The time slot number and assigned type are shown. Select 1~7 as appropriate, press ENTER to move on to the next timeslot or ESC to exit the mapping function. If we press the ENTER key now, the second timeslot will be displayed.

```
  <<  Define Time Slot Mapping  >>

TIME SLOT 02
TYPE : Channel 1

1.  NC
2.  Channel 1
3.  Channel 2
4.  Channel 3
5.  Channel 4
6.  Sub Link Data
7.  Sub Link Voice

Enter 1-7 or Press "ENTER" to next Time Slot or "ESC"
to previous menu.
```

Continue to set the timeslot mapping assignments for all 31 timeslots or ESC. This will take us back to the System Parameter menu.

```
  <<  Define System Parameter  >>


1.  Timing
2.  Main Link
3.  Sub Link
4.  Time Slot
5.  Data Port
6.  Date & Time
7.  SNMP Agent Setup


Enter 1-7 or Press "ESC" to previous menu.
```

Press 5 to define the Data port parameters.

```
  <<  Define Data Port Parameter  >>

1.  Channel 1
2.  Channel 2
3.  Channel 3
4.  Channel 4


Enter 1-4 or Press "ESC" to previous menu.
```

Press the appropriate number 1~4 corresponding to the Data Port channel to be defined. Here is an example for setting channel 1. (Note: The two channel Mux will only display channels 1 and 2.)

```
  <<  Define Channel 1 Parameter  >>

PORT TYPE   CLOCK  MULTI. CTS   SPEED     TC     RC
1    V.35   DCE    N64    ON    448Kbps NORMAL NORMAL

1.  Clock Mode
2.  Multiplier
3.  CTS
4.  TC Output
5.  RC Output

Enter 1-5 or Press "ESC" to previous menu.
```

Press 1 to define the clock mode for the selected channel.

```
  <<  Define Channel 1 Clock Mode  >>

1.  DCE
2.  DTE1
3.  DTE2
4.  DTE3


Enter 1-4 or Press "ESC" to previous menu.
```

Choose the desired clock mode or ESC to the channel selection menu.

```
  <<  Define Data Port Parameter  >>

1.  Channel 1
2.  Channel 2
3.  Channel 3
4.  Channel 4


Enter 1-4 or Press "ESC" to previous menu.
```

Now we will select Channel 2 for setting, press 2.

```
  <<  Define Channel 2 Parameter  >>

PORT TYPE   CLOCK  MULTI. CTS   SPEED     TC     RC
1    V.35   DCE    N64    ON    512Kbps NORMAL NORMAL

1.  Clock Mode
2.  Multiplier
3.  CTS
4.  TC Output
5.  RC Output

Enter 1-5 or Press "ESC" to previous menu.
```

Press item 2 to set the channel multiplier.

```
  <<  Define Channel 2 Multiplier Parameter  >>

1.  N64
2.  N56


Enter 1-2 or Press "ESC" to previous menu.
```

Press 1 to enter n64 multiplier, 2 to enter n56 multiplier or ESC to leave unchanged.

```
  <<  Define Data Port Parameter  >>

1.  Channel 1
2.  Channel 2
3.  Channel 3
4.  Channel 4


Enter 1-4 or Press "ESC" to previous menu.
```

Now we will select Channel 3 and set the CTS parameter. Press 3.

```
  <<  Define Channel 3 Parameter  >>

PORT TYPE   CLOCK  MULTI. CTS   SPEED     TC     RC
1    V.35   DCE    N64    ON    512Kbps NORMAL NORMAL

1.  Clock Mode
2.  Multiplier
3.  CTS
4.  TC Output
5.  RC Output

Enter 1-3 or Press "ESC" to previous menu.
```

Press 3 to modify the CTS setting.

```
  <<  Define Channel 3 CTS Parameter  >>

1.  ON
2.  RTS


Enter 1-2 or Press "ESC" to previous menu.
```

Enter the appropriate setting for CTS or press ESC to exit without changing.

```
  <<  Define Data Port Parameter  >>

1.  Channel 1
2.  Channel 2
3.  Channel 3
4.  Channel 4


Enter 1-4 or Press "ESC" to previous menu.
```

Now we will select Channel 4 and set the TC Output parameter. Press 4.

```
  <<  Define Channel 4 Parameter  >>

PORT TYPE   CLOCK  MULTI. CTS   SPEED     TC     RC
1    V.35   DCE    N64    ON    512Kbps NORMAL NORMAL

1.  Clock Mode
2.  Multiplier
3.  CTS
4.  TC Output
5.  RC Output

Enter 1-5 or Press "ESC" to previous menu.
```

Press 4 to modify the TC Output polarity.

```
  <<  Define Channel 4 TC Parameter  >>

1.  NORMAL
2.  INVERT


Enter 1-2 or Press "ESC" to previous menu.
```

Enter the appropriate setting for TC signal polarity, normal or inverted or press ESC to exit without changing.

```
  <<  Define Data Port Parameter  >>

1.  Channel 1
2.  Channel 2
3.  Channel 3
4.  Channel 4


Enter 1-4 or Press "ESC" to previous menu.
```

Now we will select Channel 4 and set the RC Output parameter. Press 4.

```
  <<  Define Channel 4 Parameter  >>

PORT TYPE   CLOCK  MULTI. CTS   SPEED     TC     RC
1    V.35   DCE    N64    ON    512Kbps NORMAL NORMAL

1.  Clock Mode
2.  Multiplier
3.  CTS
4.  TC Output
5.  RC Output

Enter 1-5 or Press "ESC" to previous menu.
```

Press 5 to modify the RC Output polarity.

```
  <<  Define Channel 4 RC Parameter  >>

1.  NORMAL
2.  INVERT


Enter 1-2 or Press "ESC" to previous menu.
```

Enter the appropriate setting for RC signal polarity, normal or inverted or press ESC to exit without changing.

Press ESC again to exit to the Define System Parameter.

```
  <<  Define System Parameter  >>


1.  Timing
2.  Main Link
3.  Sub Link
4.  Time Slot
5.  Data Port
6.  Date & Time
7.  SNMP Agent Setup


Enter 1-7 or Press "ESC" to previous menu.
```

The following is an example of setting the system date and time into the unit's real-time clock. Press 6.

```
  <<  Define Date & Time  >>

1.  DATE
2.  TIME

DATE : 2002/05/07 TIME : 09:30:25

Enter 1-2 or Press "ESC" to previous menu.
```

To define the Date, press 1.

Enter the 4 digit year, followed by the month (single digit months must have a leading zero) and complete with the day (single digit days must have a leading zero).

```
  <<  Define Date  >>

YEAR (1900 ~ 2099) : 2002
MONTH ( 01 ~ 12 )  : 05
DAY   ( 01 ~ 31 )  : 07
```

Following entry of the Date, the screen will revert to the Define Date & Time screen.

To define the time, press 2.

```
  <<  Define Time  >>

HOUR (00 ~ 23) : 09
MINUTE (00 ~ 59) : 31
SECOND (00 ~ 59) : 00
```

Enter the Hour (24 hour format), Minutes, and Seconds. (Single digit entries must have a leading zero.)

```
  <<  Define Date & Time  >>

1.  DATE
2.  TIME

DATE : 2002/05/07 TIME : 09:31:04

Enter 1-2 or Press "ESC" to previous menu.
```

To return to the upper level menu, press ESC.

```
<<  Define System Parameter  >>

1.  Timing
2.  Main Link
3.  Sub Link
4.  Time Slot
5.  Data Port
6.  Date & Time
7.  SNMP Agent Setup

Enter 1-7 or Press "ESC" to previous menu.
```

Note: For setting of the SNMP Agent, please refer to Chapter 6 on SNMP.
Press ESC again to reach the top level menu.

We will move on to setting the Test Function parameters. From the top menu, press 3.

```
<<  Define Test Mode Function  >>


1.  LoopBack Test
2.  Bert Test


Enter 1-2 or Press "ESC" to previous menu.
```

First we will look at the item Loop back Test, press 1.

```
   <<  Define LoopBack Test Port  >>

Main Link LoopBack: LOOPBACK OFF  Sub Link LoopBack: LOOPBACK OFF
Channel 1 LoopBack: LOOPBACK OFF  Channel 2 LoopBack: LOOPBACK OFF
Channel 3 LoopBack: LOOPBACK OFF  Channel 4 LoopBack: LOOPBACK OFF

1.  Main Link
2.  Sub Link
3.  Channel 1
4.  Channel 2
5.  Channel 3
6.  Channel 4
7.  All Channel LoopBack OFF


Enter 1-7 or Press "ESC" to previous menu.
```

The first three lines of the display show the current loop back status of the Main and Sub E1 links as well as the four Data Channels. In the next example we will set loop back type for the Main Link. Press 1.

```
  <<  Main Link LoopBack  >>

Main Link LoopBack : LOOPBACK OFF

1.  OFF
2.  Local Analog Loopback
3.  Local Digital Loopback
4.  Local Payload Loopback
5.  Remote Analog Loopback
6.  Remote Payload Loopback

Enter 1-6 or Press "ESC" to previous menu.
```

The choices presented are to turn OFF loop back or turn ON Local or Remote loop back. In the following example you will observe that the loop back will change to Local Analog. Press 2.

```
  <<  Main Link LoopBack  >>

Main Link LoopBack : LOCAL ANALOG

1.  OFF
2.  Local Analog Loopback
3.  Local Digital Loopback
4.  Local Payload Loopback
5.  Remote Analog Loopback
6.  Remote Payload Loopback

Enter 1-6 or Press "ESC" to previous menu.
```

If we now ESC back, the display of all loop back status can be observed. Note that the Main Link is now set for Local Analog.

```
   <<  Define LoopBack Test Port  >>

Main Link LoopBack: LOCAL ANALOG  Sub Link LoopBack : LOOPBACK OFF
Channel 1 LoopBack: LOOPBACK OFF  Channel 2 LoopBack: LOOPBACK OFF
Channel 3 LoopBack: LOOPBACK OFF  Channel 4 LoopBack: LOOPBACK OFF

1.  Main Link
2.  Sub Link
3.  Channel 1
4.  Channel 2
5.  Channel 3
6.  Channel 4
7.  All Channel LoopBack OFF


Enter 1-7 or Press "ESC" to previous menu.
```

(Refer to Chapter 5, Test and Diagnostics for detailed explanation of all loop back modes for use with an external Bit Error Rate Tester or the unit's internal BERT.)

Now we will select the Main Link again (Press 1) and turn OFF loopback.

```
  <<  Main Link LoopBack  >>

Main Link LoopBack : LOCAL ANALOG

1.  OFF
2.  Local Analog Loopback
3.  Local Digital Loopback
4.  Local Payload Loopback
5.  Remote Analog Loopback
6.  Remote Payload Loopback


Enter 1-6 or Press "ESC" to previous menu.
```

Press 1 to turn Off loopback.

```
  <<  Main Link LoopBack  >>

Main Link LoopBack : LOOPBACK OFF

1.  OFF
2.  Local Analog Loopback
3.  Local Digital Loopback
4.  Local Payload Loopback
5.  Remote Analog Loopback
6.  Remote Payload Loopback


Enter 1-6 or Press "ESC" to previous menu.
```

Press ESC and the status will again be displayed.

```
   <<  Define LoopBack Test Port  >>

Main Link LoopBack: LOOPBACK OFF  Sub Link LoopBack: LOOPBACK OFF
Channel 1 LoopBack: LOOPBACK OFF  Channel 2 LoopBack: LOOPBACK OFF
Channel 3 LoopBack: LOOPBACK OFF  Channel 4 LoopBack: LOOPBACK OFF

1.  Main Link
2.  Sub Link
3.  Channel 1
4.  Channel 2
5.  Channel 3
6.  Channel 4
7.  All Channel LoopBack OFF


Enter 1-7 or Press "ESC" to previous menu.
```

Now we will setup a loop back to use in the BERT setting example that follows. Enter 6 for channel 4 loop back.

```
  <<  Channel 4 LoopBack  >>

Channel 4 LoopBack : LOOPBACK OFF

1.  OFF
2.  Local Analog Loopback
3.  Local Digital Loopback
4.  V.54 Loopback


Enter 1-4 or Press "ESC" to previous menu.
```

The choices presented are to turn OFF loop back or turn ON Local or Remote loop back. In the following example you will observe that the loop back will change to V.54 Loopback. Press 4.

```
  <<  Channel 4 LoopBack  >>

Channel 4 LoopBack : V.54 LOOP

1.  OFF
2.  Local Analog Loopback
3.  Local Digital Loopback
4.  V.54 Loopback


Enter 1-4 or Press "ESC" to previous menu.
```

If we now ESC back, the display of all loop back status can be observed. Note that the Main Link is now set for Local Analog.

```
   <<  Define LoopBack Test Port  >>

Main Link LoopBack: LOOPBACK OFF  Sub Link LoopBack : LOOPBACK OFF
Channel 1 LoopBack: LOOPBACK OFF  Channel 2 LoopBack: LOOPBACK OFF
Channel 3 LoopBack: LOOPBACK OFF  Channel 4 LoopBack:  V.54 LOOP

1.  Main Link
2.  Sub Link
3.  Channel 1
4.  Channel 2
5.  Channel 3
6.  Channel 4
7.  All Channel LoopBack OFF


Enter 1-7 or Press "ESC" to previous menu.
```

Press ESC to back out to the Define Test Mode menu.

```
  <<  Define Test Mode Function  >>


1.  LoopBack Test
2.  Bert Test

Enter 1-2 or Press "ESC" to previous menu.
```

Select item 2 to define the BERT test. The display shows that BERT function is OFF but is set to run on Channel 1 with the 511 pattern by default.

```
  <<  Bert Test Parameter  >>

Function : OFF    Channel  : CH1
Pattern : 511     Error Insert : NONE

1.  Function
2.  Channel
3.  Pattern
4.  Error Insert
5.  Result

Enter 1-5 or Press "ESC" to previous menu.
```

To start BERT function, select item 1.

```
  <<  Bert Test Function  >>

Function : OFF

1.  OFF
2.  ON

Enter 1-2 or Press "ESC" to previous menu.
```

Enter 2 to Start the BERT function. Enter 1 to Stop BERT function. The next screen will show the function status if 2 is selected.

```
  <<  Bert Test Function  >>

Function : ON

1.  OFF
2.  ON

Enter 1-2 or Press "ESC" to previous menu.
```

Press ESC.

Here are the results.

```
  <<  Bert Test Parameter  >>

Function : ON      Channel  : CH1
Pattern : 511      Error Insert : NONE

1.  Function
2.  Channel
3.  Pattern
4.  Error Insert
5.  Result

Enter 1-5 or Press "ESC" to previous menu.
```

Now we will select a different channel for BERT testing. Press 2.

```
  <<  Bert Test Channel  >>

Channel  : CH1

1.  Channel 1
2.  Channel 2
3.  Channel 3
4.  Channel 4
5.  Sub Link to Main Link
6.  Sub Link to Sub Link


Enter 1-6 or Press "ESC" to previous menu.
```

Enter 4, to select channel 4 for testing.

```
  <<  Bert Test Channel  >>

Channel  : CH4

1.  Channel 1
2.  Channel 2
3.  Channel 3
4.  Channel 4
5.  Sub Link to Main Link
6.  Sub Link to Sub Link


Enter 1-6 or Press "ESC" to previous menu.
```

After pressing ESC, the parameter screen will show again.

```
  <<  Bert Test Parameter  >>

Function : ON      Channel  : CH4
Pattern : 511      Error Insert : NONE

1.  Function
2.  Channel
3.  Pattern
4.  Error Insert
5.  Result

Enter 1-5 or Press "ESC" to previous menu.
```

The default pattern is "511", to select a different pattern for testing. Enter 3.

```
  <<  Bert Test Pattern  >>

Pattern : 511

1.  511
2.  2047
3.  2e15-1
4.  2e20-1
5.  QRSS
6.  2e23-1
7.  ALL 1
8.  ALL 0
9.  ALT
A.  0011
B.  3in24
C.  1in16
D.  1in8
E.  1in4

Enter 1-E or Press "ESC" to previous menu.
```

In this example, we will enter 4, to select the 2e20-1 pattern.

```
  <<  Bert Test Pattern  >>

Pattern : ALT

1.  511
2.  2047
3.  2e15-1
4.  2e20-1
5.  QRSS
6.  2e23-1
7.  ALL 1
8.  ALL 0
9.  ALT
A.  0011
B.  3in24
C.  1in16
D.  1in8
E.  1in4

Enter 1-E or Press "ESC" to previous menu.
```

Press ESC. Note in the screen below, the function is ON, channel is CH4 and pattern is 2e20-1.

```
  <<  Bert Test Parameter  >>

Function : ON     Channel  : CH4
Pattern : 2e20-1  Error Insert : NONE

1.  Function
2.  Channel
3.  Pattern
4.  Error Insert
5.  Result

Enter 1-5 or Press "ESC" to previous menu.
```

An important function of BERT is the ability to insert errors at a pre-defined error rate or to insert single bit errors on command. Press 4.

```
  <<  Bert Test Error Insert  >>

Error Insert : NONE

1.  NONE
2.  SINGLE
3.  10e-1
4.  10e-2
5.  10e-3
6.  10e-4
7.  10e-5
8.  10e-6
9.  10e-7


Enter 1-9 or Press "ESC" to previous menu.
```

Press 2, to insert single errors on command.

```
  <<  Bert Test Error Insert  >>

Press "ENTER" to insert single error or "ESC" to
previous menu
```

With each press of the ENTER key, one error will be inserted.

```
  <<  Bert Test Error Insert  >>

Press "ENTER" to insert single error or "ESC" to
previous menu
```

Press ENTER inserts another error.

```
  <<  Bert Test Error Insert  >>

Press "ENTER" to insert single error or "ESC" to
previous menu
```

Press ESC.

```
  <<  Bert Test Error Insert  >>

Error Insert : SINGLE
1.  NONE
2.  SINGLE
3.  10e-1
4.  10e-2
5.  10e-3
6.  10e-4
7.  10e-5
8.  10e-6
9.  10e-7

Enter 1-9 or Press "ESC" to previous menu.
```

In addition, the error insert rate may be set from 10^{-7} to 10^{-1}. Press ESC again to the Parameter screen.

```
  <<  Bert Test Parameter  >>

Function : ON     Channel  : CH4
Pattern : 2e20-1  Error Insert : SINGLE
1.  Function
2.  Channel
3.  Pattern
4.  Error Insert
5.  Result

Enter 1-5 or Press "ESC" to previous menu.
```

To view the Results of BERT testing, press 5.

```
  <<  Display BERT Test Results  >>

Rx Bit: 25616642
Rx Error Bit: 7
Rx Error Rate: 2.7e-07

Press "ESC" to previous menu or "SPACE" to review,
"ENTER" to clear.
```

Press "Enter" to reset the counters, "SPACE" will refresh the display.

After viewing the BERT results, press ESC.

```
  <<  Bert Test Parameter  >>

Function : ON     Channel  : CH4
Pattern : 2e20-1  Error Insert : SINGLE

1.  Function
2.  Channel
3.  Pattern
4.  Error Insert
5.  Result

Enter 1-5 or Press "ESC" to previous menu.
```

To turn off the BERT function, call up the function menu. Press 1.

```
  <<  Bert Test Function  >>

Function : ON

1.  OFF
2.  ON


Enter 1-2 or Press "ESC" to previous menu.
```

Press 1, to turn off BERT.

```
  <<  Bert Test Function  >>

Function : OFF

1.  OFF
2.  ON


Enter 1-2 or Press "ESC" to previous menu.
```

Press ESC.

```
  <<  Bert Test Parameter  >>

Function : OFF    Channel  : CH4
Pattern : 2e20-1  Error Insert : SINGLE

1.  Function
2.  Channel
3.  Pattern
4.  Error Insert
5.  Result

Enter 1-5 or Press "ESC" to previous menu.
```

Press ESC again.

```
  <<  Define Test Mode Function  >>


1.  LoopBack Test
2.  Bert Test


Enter 1-2 or Press "ESC" to previous menu.
```

Press ESC one last time to reach to top level menu.

```
  ******************************************
  ****   CTC UNION TECHNOLOGIES CO.,LTD   ****
  ****      ETU-02/SNMP TERMINAL MODE     ****
  ****       SETUP MENU  Ver. 1.38        ****
  ******************************************

1.  Display System Status.
2.  Define System Parameter.
3.  Test Function Parameter.
4.  Password
5.  Reset Data to Default.
6.  EXIT

DATE : 2002/05/07 TIME : 10:15:49


Enter 1-6 to select function.
```

The following is an example of Password setting for the *ETU02-MUX*.

Press 4.

```
  <<  Password  >>

1.  Set Password
2.  Clear Password


Enter 1-2 or Press "ESC" to previous menu.
```

Enter 1 to set the password.

```
  <<  Entry Password  >>

Enter Password ( 4 Number ) :
```

Enter 1234.

```
*** Password entry successful. ***

Press "ESC" to previous menu.
```

Note: If you should ever forget the password, you may clear it with the factory default password, which is: ctcu (any case upper or lower, doesn't matter) Shhh… Keep it a secret.

Press ESC.

```
  <<  Password  >>

1.  Set Password
2.  Clear Password


Enter 1-2 or Press "ESC" to previous menu.
```

To clear the password, press 2.

```
  <<  Clear Password  >>


Enter Original Password :
```

Enter the original password, 1234.

```
*** Password is DISABLED ***


Press "ESC" to previous menu.
```

Press ESC.

```
  <<  Password  >>

1.  Set Password
2.  Clear Password


Enter 1-2 or Press "ESC" to previous menu.
```

Press ESC back to main menu.

```
  ******************************************
  ****   CTC UNION TECHNOLOGIES CO.,LTD   ****
  ****      ETU-02/SNMP TERMINAL MODE     ****
  ****       SETUP MENU  Ver. 1.38        ****
  ******************************************

1.  Display System Status.
2.  Define System Parameter.
3.  Test Function Parameter.
4.  Password
5.  Reset Data to Default.
6.  EXIT

DATE : 2002/05/07 TIME : 10:16:12

Enter 1-6 to select function.
```

To reset all parameters to the original factory default settings, press 5.
******WARNING***** The reset function is performed without further prompting!!!!**
All settings including the real time clock are effected. The following will immediately be displayed. If you see this message, the unit has already reset.

```
*** Already Reset Data to Default. ***

Press "ESC" to previous menu.
```

Press ESC.

```
  ******************************************
  ****   CTC UNION TECHNOLOGIES CO.,LTD   ****
  ****      ETU-02/SNMP TERMINAL MODE     ****
  ****       SETUP MENU  Ver. 1.38        ****
  ******************************************

1.  Display System Status.
2.  Define System Parameter.
3.  Test Function Parameter.
4.  Password
5.  Reset Data to Default.
6.  EXIT

DATE : 1999/03/01 TIME : 00:00:05

Enter 1-6 to select function.
```

To exit the terminal mode. press 6. The terminal connection will be dropped and the following will display.

```
ETU-02 TERMINAL MODE IS DISCONNECTED
```

The front panel LCD will return to its normal condition.

This completes the detailed examples of terminal mode operation for the *ETU02-MUX*.

Chapter 5. Test and Diagnostics

5-1. General

The ***ETU02-MUX*** diagnostics functions include:

Status indications and messages.

User activated loop back.

Integrated Bit Error Rate Test (BERT).

The loop back tests are activated via the user data port, front panel LCD interface or from the console terminal menu. The ***ETU02-MUX*** also offers bit error rate testing on both the synchronous data channel or the E1 sub link, using a locally generated pseudo-random sequence. To provide compatibility with other BERT equipment, you may define the pseudo-random pattern.

5-2. Status Indicators and Messages

Indicators:

The status of the ***ETU02-MUX*** is indicated by viewing the Signal Loss, Sync Loss, Alarm, Error and Test LED indicators. User data channel activity is indicated by the corresponding RD and TD LED indicators.

Table 5-1 LED indicators

Indicator	Color	Function
PWR	Green	ON when power is on.
Signal Loss	Red	ON when received signal is lost.(main E1 & sub E1)
Sync Loss	Red	ON when received frame sync is lost.(main E1 & sub E1)
Alarm	Red	ON when main E1 or sub E1 has an alarm. (Includes: BPV (Bipolar Violation) error / CRC4 error / Frame slip / All one / Remote alarm)
RD	Yellow	ON when SPACE is being received.(CH1,CH2,CH3,CH4) Off when MARK is being received. Flashing when data is received.
TD	Yellow	ON when SPACE is being transmitted (CH1,CH2,CH3,CH4) Flashing when data is transmitted.
Error	Red	ON when BERT function is activated and detects bit errors.
Test	Red	ON when the ***ETU02-MUX*** is in any loop back mode or BERT function is on.

Display:

The ***ETU02-MUX*** maintains an alarm buffer. The buffer can store one alarm event of each type along with the time of occurrence. A maximum of 256 alarms may be displayed on the front panel or the terminal.

Table 5-2 presents the alarm messages generated by the ***ETU02-MUX***.

Table 5-2 Alarm Message

Message	Description	Corrective Actions	Alarm type
POWER	Power ON/OFF time.		ON/OFF
BRG1 FAILURE BRG2 FAILURE BRG3 FAILURE BRG4 FAILURE	The data port CH1-CH4 baud rate generator failure. Only tested at power on.	Check the clock mode of the responding user data channel. Replace the ***ETU02-MUX***.	ON
FIFO1 SLIP FIFO2 SLIP FIFO3 SLIP FIFO4 SLIP	The data port CH1-CH4 FIFO buffer suffered an overflow or underflow, usually caused by inconsistencies in clock rates.	Check the clock mode of the responding user data channel. Replace the ***ETU02-MUX***.	ON
FALLBACK CLK	The ***ETU02-MUX*** has switched to the backup clock source.	Check the master clock source: ML-fails when the main link suffers a loss of signal. CH1, CH2, CH3, CH4-fails when data channel equipment is disconnected or inoperative. SL-fails when the sub link suffers a loss of signal.	ON/OFF
DATABASE CS ERR	The ***ETU02-MUX*** technical failure. The data base currently stored in the non-volatile memory is corrupted.	Press ENTER to load the default configuration, resetting all the parameters. Perform the power up self test and replace the ***ETU02-MUX*** if a failure is detected.	ON/OFF
SELF TEST ERR	A problem has been detected during power on self-test.	Replace the ***ETU02-MUX.***	ON

ML SIG. LOSS	Loss of main link receive signal.	Check cable connections to the main link connector. Check other equipment providing the link to the ***ETU02-MUX.***	ON/OFF
ML SYNC LOSS	Loss of main link frame sync.	Check cable connections to the main link connector. Check other equipment providing the same frame link to the ***ETU02-MUX.*** Replace the ***ETU02-MUX.***	ON/OFF
ML BPV ERROR	Bipolar violations in the main link receive signal. Updated once per second.	Check that line attenuation does not exceed that specified for E1 line. Check other equipment providing the same line code to the ***ETU02-MUX***.	ON
ML CRC-4 ERROR	CRC-4 errors detected in main link receive signal. Updated once per second.	Check other equipment providing the same frame link to the ***ETU02-MUX.***	ON
ML FRAME SLIP	Main link frame slips are detected. Updated once per second.	Incorrect selection of master clock source. Problem with the equipment connected to the remote end of the link, unstable clock source.	ON
ML AIS	Main E1/Datacom link receiving an all ones signal.	Problem with the equipment connected to the remote end of the link.	ON/OFF
SL SIG. LOSS	Loss of sub link receive signal.	Check cable connections to the sub link connector. Check other equipment providing the link to the ***ETU02-MUX***.	ON/OFF
SL SYNC LOSS	Loss of sub link frame sync.	Check cable connections to the sub link connector. Check other equipment providing the same frame link to the ***ETU02-MUX***. Replace the ***ETU02-MUX.***	ON/OFF
SL BPV ERROR	Bipolar violations in the sub link receive signal. Updated once per second.	Check that line attenuation does not exceed that specified for E1 line. Check other equipment providing the same line code to the ***ETU02-MUX***.	ON
SL CRC-4 ERROR	CRC-4 errors detected in sub link receive signal. Updated once per second.	Check other equipment providing the same frame link to the ***ETU02-MUX***.	ON

SL FRAME SLIP	Sub link frame slips are detected. Updated once per second.	Incorrect selection of master clock source. Problem with the equipment connected to the remote end of the link, unstable clock source.	ON
SL AIS	Main link receiving all ones signal.	Problem with the equipment connected to the remote end of the link.	ON/OFF

5-3. User activated loop back.

The ***ETU02-MUX*** supports the following types of test loop backs.
Main link local analog, digital, and payload loop backs
Main link remote analog and payload loop backs
Sub link local analog and digital loop backs
Sub link remote loop back
Channel 1-4 local analog and digital loop backs
Channel 1-4 V.54 (remote) loop back

The user activated loop back functions are accessed from the LOOPBACK PARAMETER menu. The available test functions are described in the following paragraphs.

Main link local analog loop back

The Main link local analog loop back is performed by connecting the main link transmit signal to the input of the receive path, as shown in Figure 5-1. This returns the transmit signal of each data port and sub link to the receive path of the same port. Each channel (including sub link) must receive its own transmission. This loop back fully tests the local ***ETU02-MUX*** operation and the connections to the local DTEs. During this loop back, the ***ETU02-MUX*** main link sends an unframed “all ones” signal to the remote equipment. Before initiating this loop back, disconnect any LAN cables from the rear panel of any Ethernet interface modules.

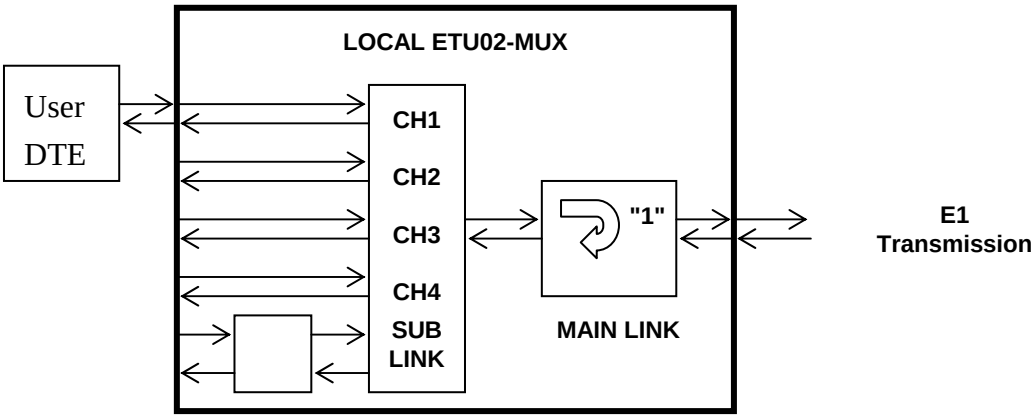


Figure 5-1. Main link local analog loop back

Main link local digital loop back

The Main link local digital loop back is performed by connecting the main link receive signal to the output of the transmit path, as shown in Figure 5-2. This loop back returns the received signal of the main link back out the transmit path. Each channel (including sub link) on the remote side must receive its own transmission. This loop back enables the remote ***ETU02-MUX*** to receive back its transmitted data and confirm the connections to the local ***ETU02-MUX***.

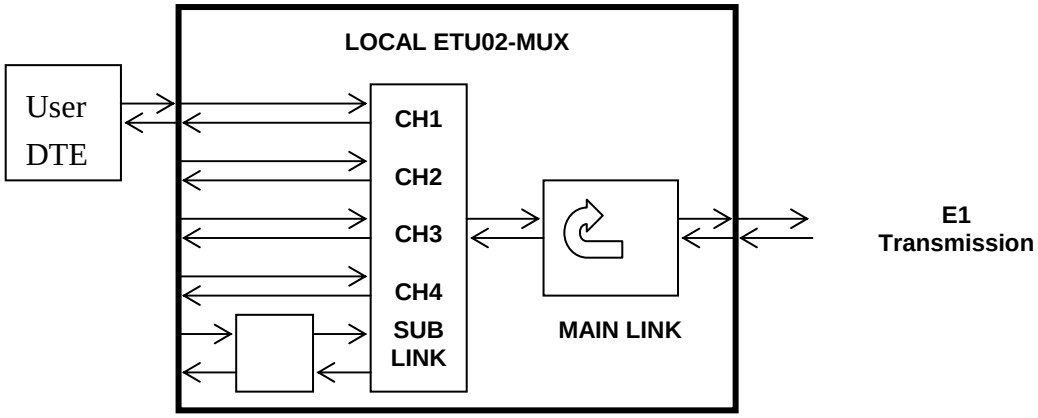


Figure 5-2. Main link local digital loop back

Main link local payload loop back

The Main link local payload loop back is performed by connecting the timeslot payload data only (without framing or unused timeslots) from the receive data to the output of the transmit path, as shown in Figure 5-3. This returns the received data of each port on the transmit path to the same port. Each channel (including sub link) must receive its own transmission. This loop back enables the remote ***ETU02-MUX*** to receive back its test signals and confirm the connections to the remote DTEs.

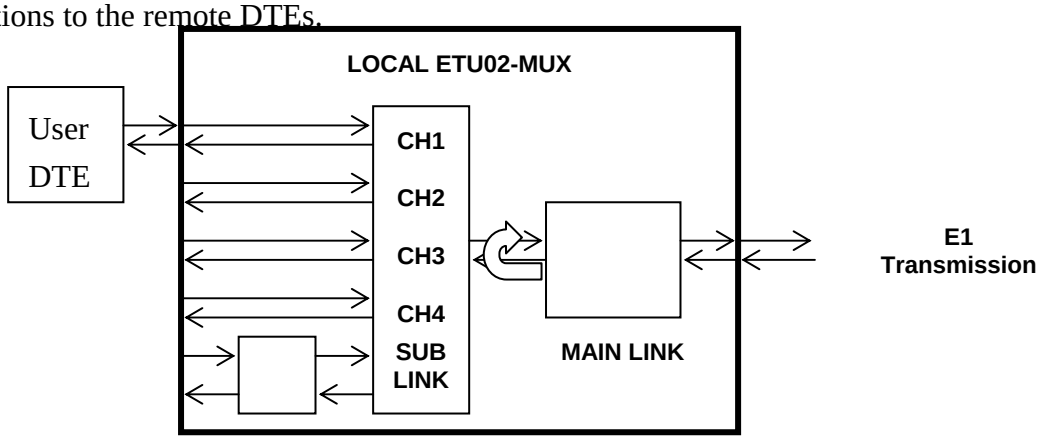


Figure 5-3. Main link local payload loop back

Main link remote analog loop back

The main link remote analog loop back is performed by sending a loop back code to the remote unit. The remote unit then connects its main link receive signal to the output of the transmit path. This loop back test checks the performance of the local ***ETU02-MUX***, the remote ***ETU02-MUX*** and the connections between them, as shown in Figure 5-4.

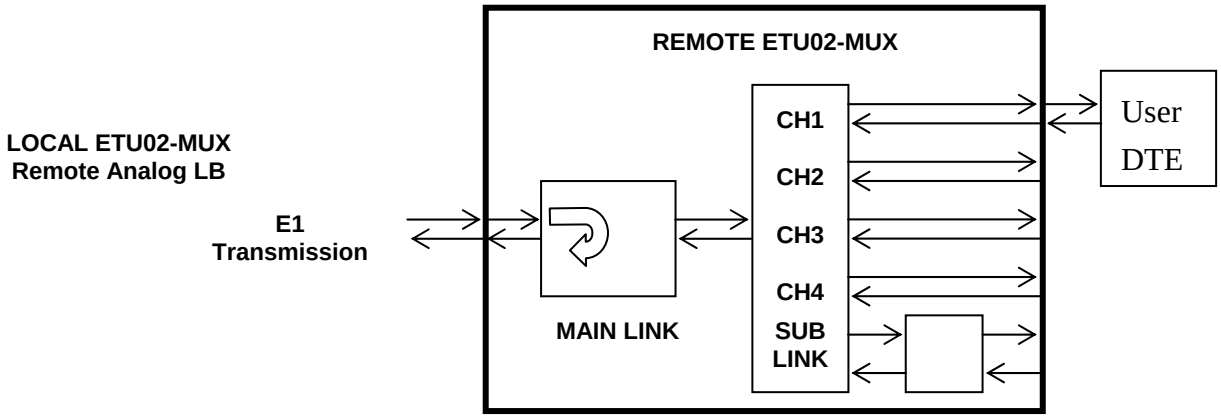


Figure 5-4. Main link remote analog loop back

Note:

The remote loop back codes, also referred to as data link messages, for the ***ETU02-MUX*** utilize the 4 spare Sa bits within the framing timeslot (TS0). Therefore, any remote loop back functions, including remote analog loop back (LLB) and remote payload loop back (PLB) are only available when running in framed mode (PCM30 or PCM31). Unframed mode does not support any remote loop back functions.

Main link remote payload loop back

The main link remote payload loop back is performed by sending a loop back code to the remote unit. The remote unit then connects the main link payload to the output of the transmit path. This loop back test checks the performance of the local ***ETU02-MUX***, the remote ***ETU02-MUX*** and the connections between them, as shown in Figure 5-5.

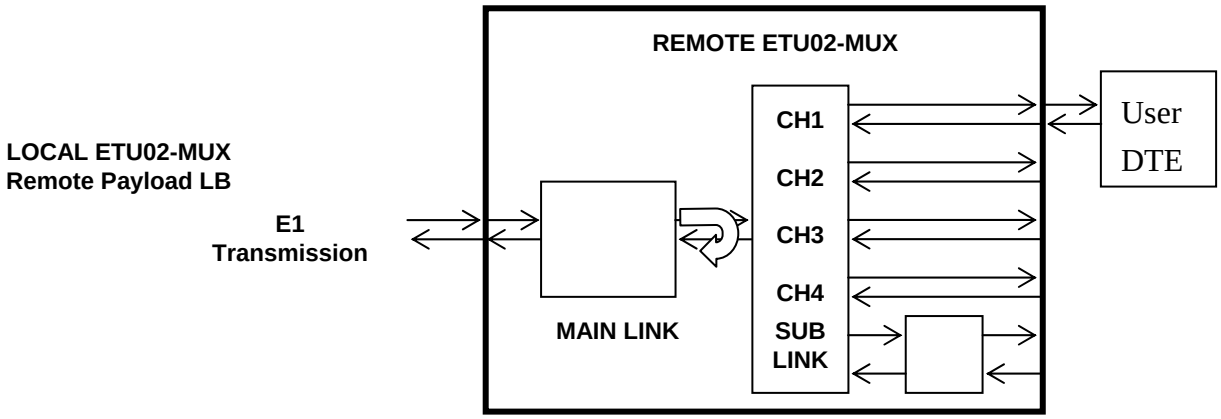


Figure 5-5. Main link remote payload loop back

Sub link local analog loop back

The sub link local analog loop back is performed by connecting the sub link transmit signal to the input of the receive path, as shown in Figure 5-6. This loop back test checks the connection to the equipment connected to the local sub link. The test signal is provided by the equipment connected to the local sub link.

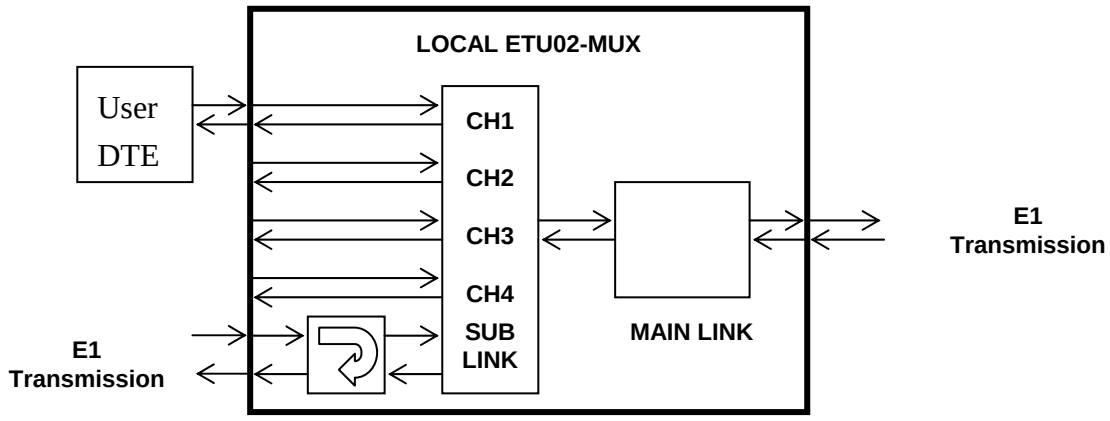


Figure 5-6. Sub link local analog loop back

Sub link local digital loop back

The sub link local digital loop back is performed by connecting the sub link receive signal to the output of the transmit path, as shown in Figure 5-7. This loop back is used when testing from the remote equipment and tests the local ***ETU02-MUX*** and the connection to the remote equipment. The test signal is provided by the equipment connected to the remote sub link. During this loop back, the ***ETU02-MUX*** sub link sends an unframed "all ones" signal to the equipment connected to the local sub link.

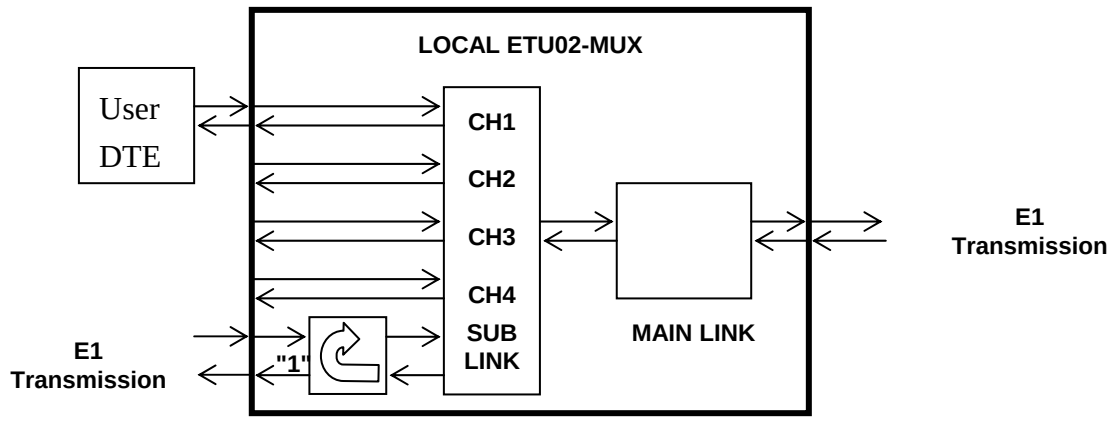


Figure 5-7. Sub link local digital loop back

Sub link remote loop back

The sub link remote loop back is performed by sending a loop back code to the remote unit. The remote unit then connects its sub link transmit signal to the input of the receive path, as shown in Figure 5-8. This loop back test checks the performance of the local ***ETU02-MUX***, the remote ***ETU02-MUX*** and the connection between them. During this loop back, the ***ETU02-MUX*** sub link sends an unframed "all ones" signal to the equipment connected to the remote sub link.

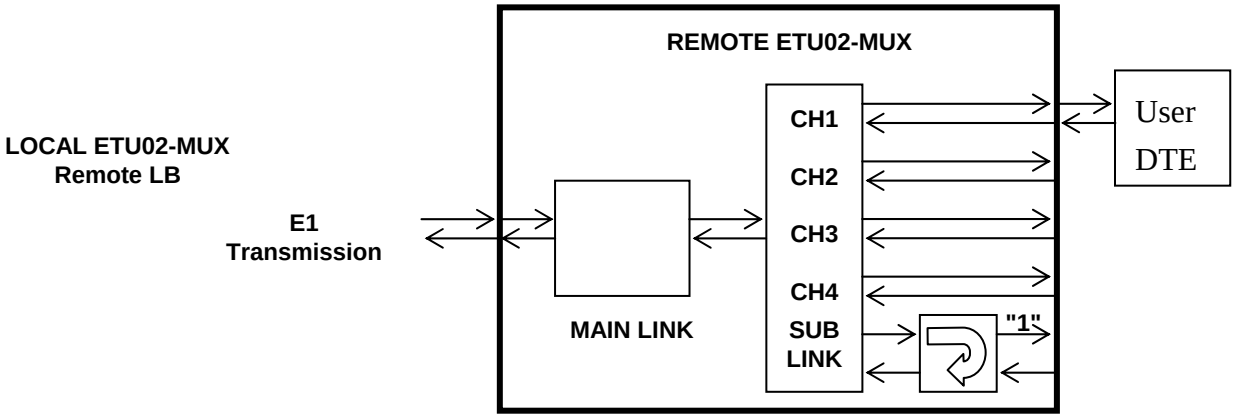


Figure 5-8. Sub link remote loop back

Channel 1-4 local analog loop back.

The channel local analog loop back is performed by connecting the data channel transmit data (TD) to the input of the receive path (RD), as shown in Figure 5-9. The test signal is provided by the local DTE.

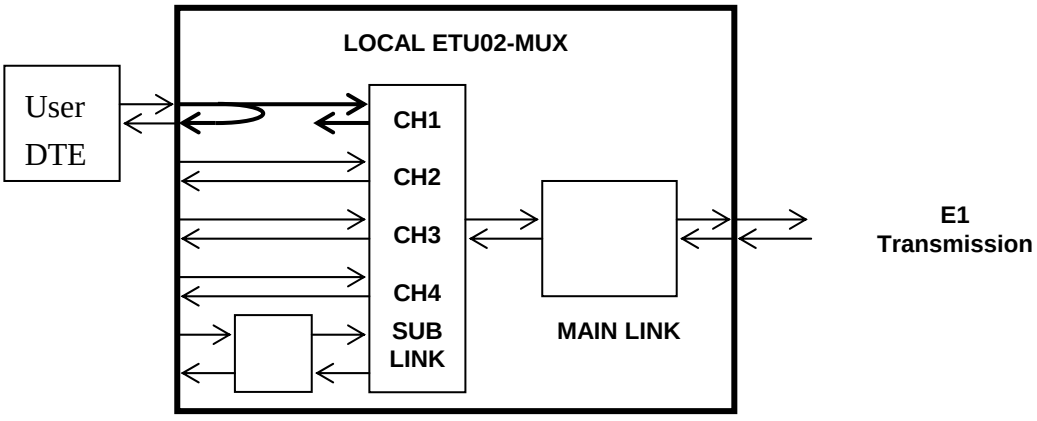


Figure 5-9. Channel local analog loop back

Channel 1-4 local digital loop back.

The channel local digital loop back is performed by connecting the local data channel receive data (RD) to the data channel transmit input (TD), as shown in Figure 5-10. The test signal is provided by the remote user DTE.

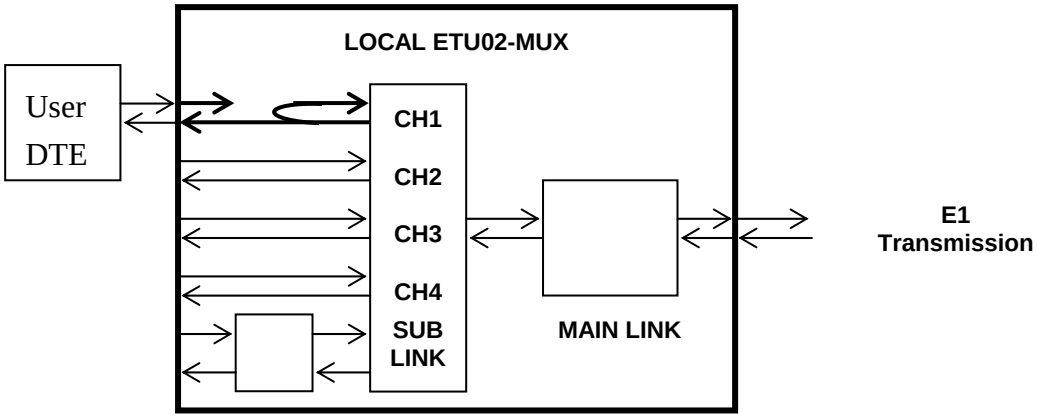


Figure 5-10. Channel local digital loop back

Channel 1-4 V.54 remote loopback.

The channel V.54 remote loopback is performed by sending standard V.54 loop back codes to the remote channel unit. The remote unit then connects its local data channel receive data (RD) to the channel transmit input (TD), as shown in Figure 5-11. This loop back test checks the performance of the local DTE, connection to the ***ETU02-MUX***, the local ***ETU02-MUX***, the connection to the remote ***ETU02-MUX***, the remote ***ETU02-MUX***, the connection to the remote DTE and the remote DTE. The test signal is provided by the local user DTE.

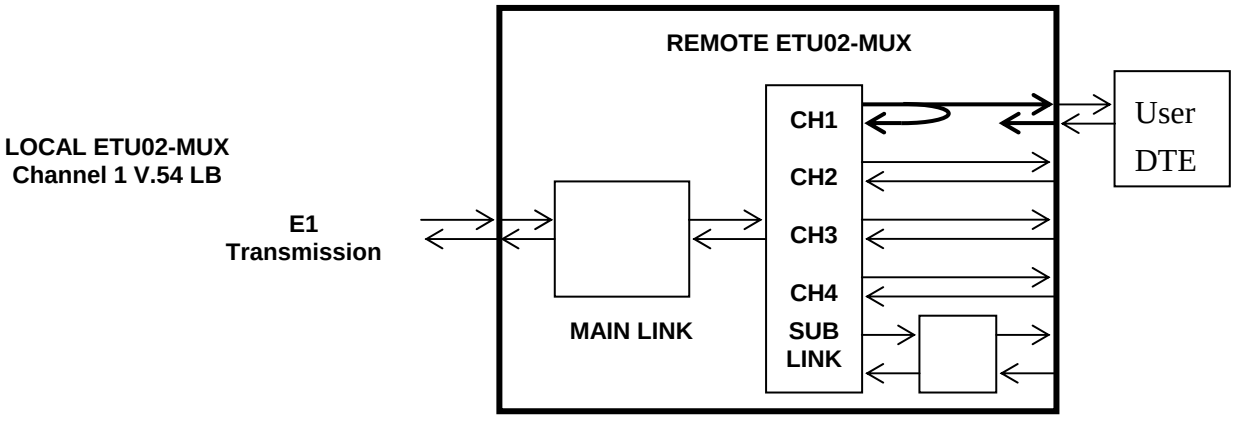


Figure 5-11. Channel V.54 remote loop back

Integrated Bit Error Rate Test (BERT).

The built-in BERT testing may be performed on one channel at a time. During the test, the local DTE is disconnected and the DSR line is off. An internal pattern generator connects a user selected test sequence to the transmit input of the local data channel interface. To calibrate the system, the user can inject errors at a selectable rate. The receive output is connected to a pattern tester. The tester compares the received and transmitted patterns and detects errors.

For a **local test** (stand alone unit), first enable the main link local analog loop back (or hardwire main link TX connector to RX) to return the data back to the local DTE, as shown in Figure 5-12.

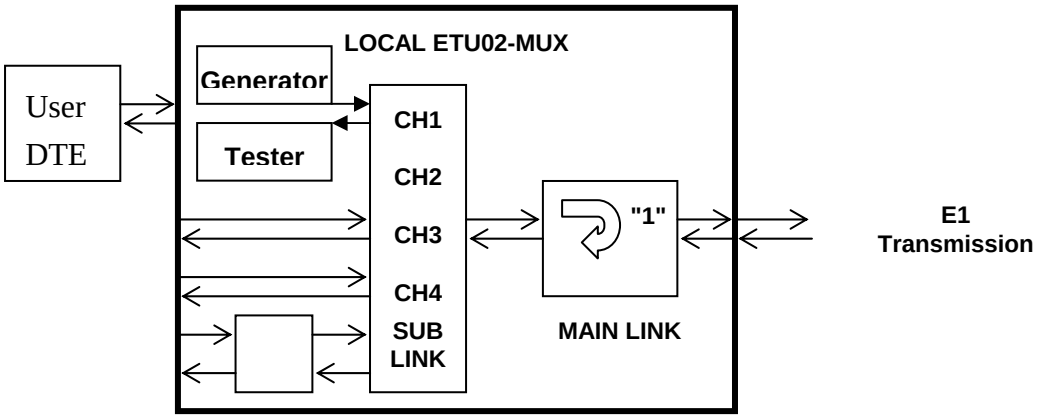


Figure 5-12. BERT for local test

(BERT on Channel 1, Main Link analog loop back.)

Test Steps:

Enable main link analog loop back; From the main menu select "3. Test Function Parameter", then select "1. LoopBack Test", then select "3. Channel 1", and lastly select "2. Local Analog Loopback".

Start BERT; From the "Define Test Mode Function" menu, select "2. Bert Test".

Select the channel; Enter "2. Channel" and select "1. Channel 1", then "ESC".

Select a pattern; Enter "3. Pattern" and select "5. QRSS", then "ESC".

Start the function; Enter "1. Function" and select "2. ON", then "ESC".

View the results; Enter "5. Result". You may clear the counters by pressing "ENTER" or refresh the display by pressing "SPACE".

```
<<  Display BERT Test Results  >>

Rx Bit: 7630994
Rx Error Bit: 0
Rx Error Rate: 0.0e-00

Press "ESC" to previous menu or "SPACE" to review,
"ENTER" to clear.
```

The display shows the total received bits (Rx Bit), the total error bits received (Rx Error Bit), and calculates the error rate (error bits ÷ total received bits = Rx Error Rate).

For a **system test**, first enable the main link remote digital loop back or the channel V.54 remote loop back to return the data back to the local DTE, as shown in Figure 5-13.

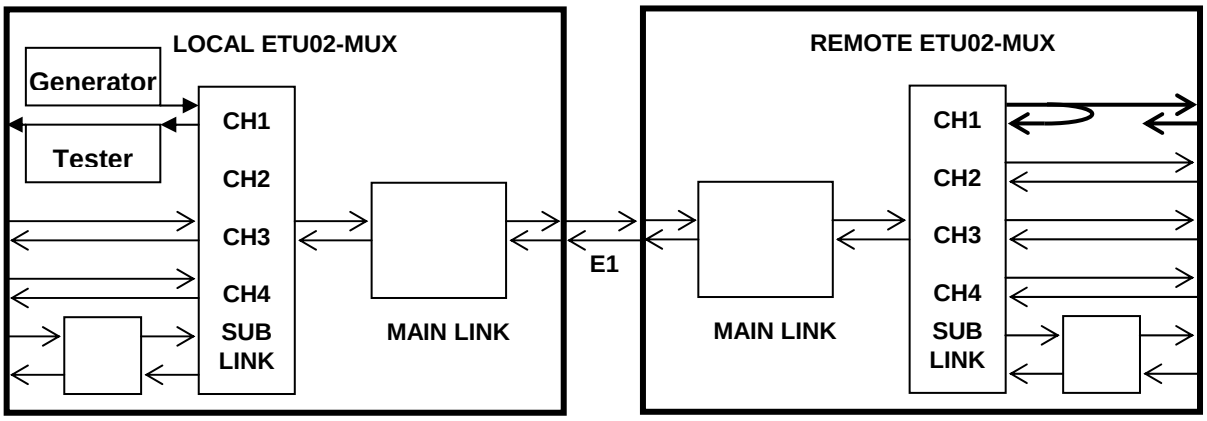


Figure 5-13. BERT used for system test

Test Steps:

Enable channel 1 V.54 Loop; From the main menu select "3. Test Function Parameter", then select "1. LoopBack Test", then select "3. Channel 1", and lastly select "4. V.54 Loopback".

Start BERT; From the "Define Test Mode Function" menu, select "2. Bert Test".

Select the channel; Enter "2. Channel" and select "1. Channel 1", then "ESC".

Select a pattern; Enter "3. Pattern" and select "5. QRSS", then "ESC".

Start the function; Enter "1. Function" and select "2. ON", then "ESC".

View the results; Enter "5. Result". You may clear the counters by pressing "ENTER" or refresh the display by pressing "SPACE".

```
  <<  Display BERT Test Results  >>

Rx Bit: 4994889
Rx Error Bit: 0
Rx Error Rate: 0.0e-00

Press "ESC" to previous menu or "SPACE" to review,
"ENTER" to clear.
```

The display shows the total received bits (Rx Bit), the total error bits received (Rx Error Bit), and calculates the error rate (error bits ÷ total received bits = Rx Error Rate).

Test the link by manually inserting a single error. From the "Bert Test Parameter" menu, enter "4. Error Insert" and select "2. Single". Press "ENTER", then "ESC" twice. View the results by entering "5. Result" and confirm that one single error was entered or added to the Rx Error Bits.

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Chapter 6. SNMP Operation

6-1 Introduction

Installation of the SNMP feature should be performed only by qualified service personnel. As with all electronic devices that are powered from an AC line, dangerous voltages may be present inside the unit. The technician should exercise proper care and judgment. Only open the unit for service after disconnecting the unit from the power source. This documentation will explain in detail the proper procedure for installation of the SNMP printed circuit board feature for the ETU02-MUX. This procedure may also required replacement of the operational firmware for older versions of the ETU02-MUX as the older firmware does not support the SNMP card functions.

6-2 Required tools and supplies

1. No.2 Philips head screwdriver
2. thread lock compound (such as Glyptol™)
3. small, flat blade screwdriver (to aid in replacing firmware IC)

6-3 Installation Procedure (Please refer to the attached drawing)

1. Inspect the contents of the SNMP kit. It should contain one(1) SNMP card, three(3) brass standoffs, six(6) 3mm screws, one(1) SNMP connector plate, MIB file floppy diskette or CDROM, and possibly a 32pin EEPROM.
2. From the rear of the unit, disconnect all power, data port, and E1 cabling from the unit. Loosen the two captive thumb-screws located on the lower left and right of the unit. Carefully slide the mother PCB out of the case and place on a flat, clean work area. (Refer to Figure 1.)
3. Remove the SNMP connector cover mounting screws (2) with a Philips head screwdriver. Save these screws for attachment of the new cover plate. DO NOT ATTACH AT THIS TIME.
4. Refer to Figure 2, the mounting detail. Apply thread-lock to three mounting screws and attach the three brass standoffs to the main PCB as shown. The standoffs are to be located on the component side of the main PCB.
5. Install the SNMP pc board by placing the RJ-45 connector side into the rear panel cutout. Align the pins of the SNMP card with the 32pin connector and seat the card. Ensure that no pins are bent and that all pins have been received into the connector socket on the main PCB.
6. Use the remaining 3mm screws to hold down the SNMP card. Do not over tighten, just tighten snug. Apply Gloptol™ to the hold down screws at your discretion. Refer to the mounting detail Figure 2.
7. Attach the beauty-plate on the rear panel, ensuring the RJ-45 connector and link-LED are properly aligned. Use the previously released screws from step 3 above.
8. If the firmware needs to be upgraded, use a flat-blade screwdriver to carefully remove the EEPROM IC from PCB location U7 (refer to Figure 1). Ensure that the pins of the new IC are straight, align the pins with the IC socket and carefully seat the new IC. Excessive force should not be required. Inspect all 32 pins to ensure proper seating and that no pins were inadvertently bent during insertion.
9. If the system firmware has been replaced, a system reset will be required to initialize the system properly. Return the motherboard to the case, tighten the captive thumb-screws and re-attach all cables and power. Perform a system reset followed by re-configuration and normal loop back diagnostics.

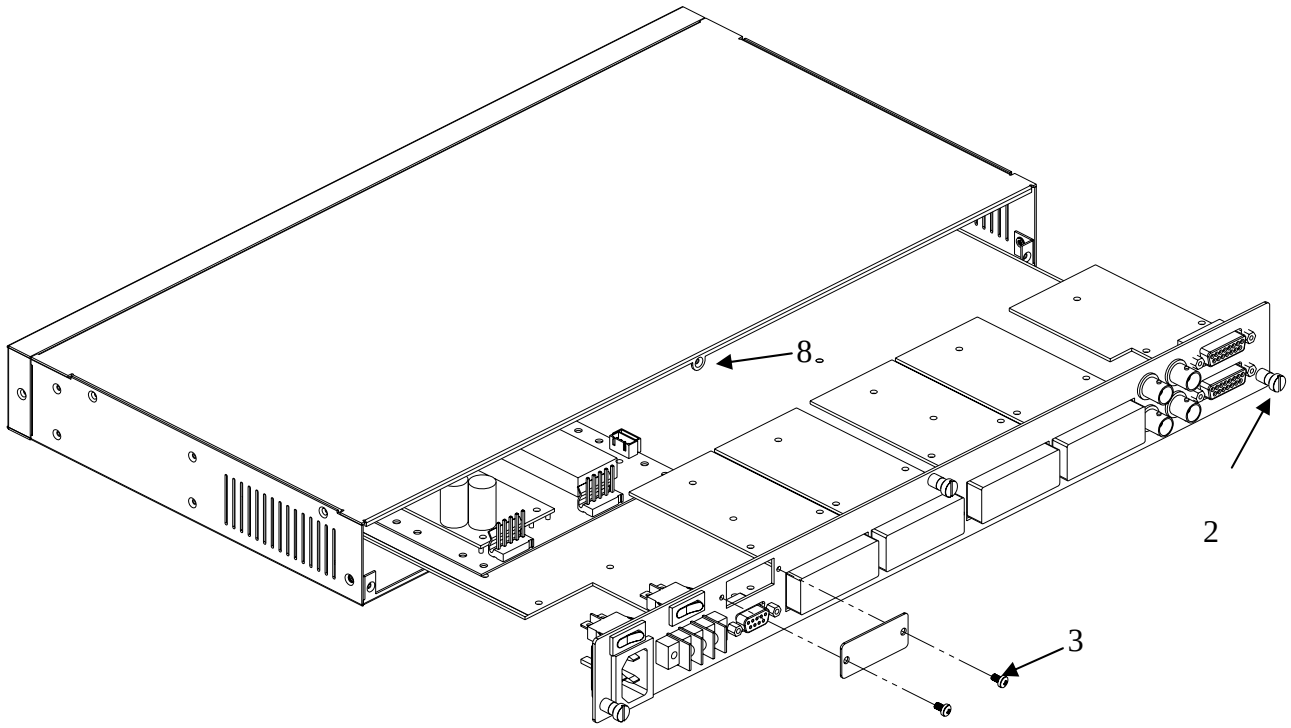


Figure 6-1 Main PCB removal, ETU-02 MUX

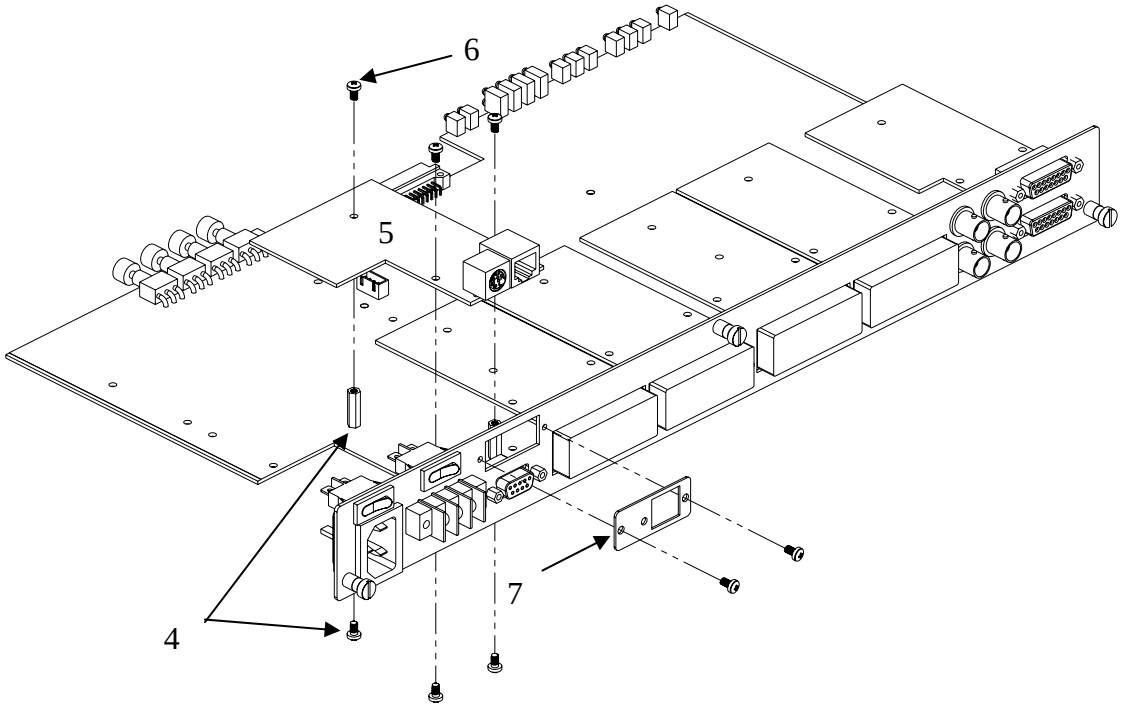


Figure 6-2 Mounting Detail

6-4 SNMP Overview

The Simple Network Management Protocol (SNMP) is one of many protocols in the Internet Protocol (IP) suite. SNMP is the protocol recommended specifically for the exchange of management information between hosts residing on IP networks. Network management allows you to monitor and control network devices remotely using conventional computer network technology.

The SNMP management functions of the ***ETU02-MUX*** are provided by an internal SNMP agent, which utilizes out-of-band communication over standard 10Base-T Ethernet. The SNMP agent is compliant with the SNMPv1 standard. SNMP communication uses the User Datagram Protocol (UDP). UDP is a connectionless transport protocol, part of the IP suite. The SNMP application uses an asynchronous command/response polling protocol and operates at the OSI Layer 7 (Layer 7 is the Application Layer. Other IP applications that operate at this layer are FTP, Telnet, SMTP, etc.). All management traffic is initiated by the SNMP-based network management station. Only the addressed managed entity (agent) answers the polling of the management station (except for trap messages).

SNMP Operations

The SNMP protocol includes four types of operations:

getRequest	Command for retrieving specific value of an “instance” from the managed node. The managed node responds with a **getResponse** message.
getNextRequest	Command for retrieving sequentially specific management information from the managed node. The managed node responds with a **getResponse** message.
setRequest	Command for manipulating the value of an “instance” within the managed node. The managed node responds with a **getResponse** message.
trap	Management message carrying unsolicited information on extraordinary events (that is, events which occurred not in response to a management operation) reported by the managed node.

The Management Information Base

The management information base (MIB) includes a collection of managed objects. Managed objects are defined as parameters that can be managed, such as specific information on device configuring or on performance statistics values.

The MIB includes the definitions of relevant managed objects (MIB variables) for the specific node. Various MIB's can be defined for various management purposes, types of equipment, etc. The management data itself is a collection of integer, string and MIB address variables that contain all the information necessary to manage the node.

A leaf object's definition includes the range of instances (values) and the "access" rights:

Read-only	Instances of an object can be read, but cannot be set.
Read-write	Instances of an object can be read or set.
Write-only	Instances of an object can be set, but cannot be read.
Not accessible	Instances of an object cannot be read, nor set.

MIB Structure

The MIB has an inverted tree-like structure (root over leaves), with each definition of a managed instance forming one leaf, located at the end of a branch of that tree. Each "leaf" in the MIB is reached by a unique path, therefore by numbering the branching points, starting with the top, each leaf can be uniquely defined by a sequence of numbers. The formal description of the managed objects and the MIB structure is provided in a special standardized format, called Abstract Syntax Notation 1, or ASN.1 (pronounced A-S-N dot one).

Since the general collection of MIB's can also be organized in a similar structure, under the supervision of the Internet Activities Board (IAB), any parameter included in a MIB that is recognized by the IAB is uniquely defined.

To provide the flexibility necessary in a global structure, MIB's are classified in various classes (branches), one of them being the experimental branch, another being the management (mgmt) branch, and yet another the group of private (enterprise-specific) branch. Under the private enterprise-specific branch of MIB's, each enterprise (manufacturer) can be assigned a number, which is its enterprise number. The assigned number designates the top of an enterprise-specific sub-tree of non-standard MIB's. Within this context, CTC Union has been assigned the enterprise number 4756. Under this scheme, the path to CTC Union's Enterprise branch would be:

`iso(1).org(3).dod(6).internet(1).private(4).enterprises(1).ctcu(4756)`

Enterprise-specific MIB's are published and distributed by their creators, who are responsible for their contents. Specific information regarding the CTC Union's sub-tree are available from CTC Union's Research and Development Division.

The MIB supported by the ***ETU02-MUX*** SNMP Agent follows RFC 1158 (MIB-II standard).

SNMP Communities

To enable the delimitation of management domains, SNMP uses "communities". Each community is identified by a name, which is an alphanumeric string of up to 255 characters defined by the user. Any SNMP entity (this term includes both managed nodes and management stations) is assigned by its user a community name. In parallel, the user defines for each SNMP entity a list of the communities which are authorized to communicate with it, and the access rights associated with each community (this is the SNMP community name table of the entity).

In general, SNMP agents support two types of access rights:

Read-only	the SNMP agent accepts and processes only SNMP **getRequest** and **getNextRequest** commands from management stations which have a read-only community name.
Read-write	the SNMP agent accepts and processes all the SNMP commands received from a management station with a read-write community name. SNMP agents are usually configured to send traps to management stations having read-write communities.

6-5 Configuring the ETU02-MUX SNMP Agent

The agent for the ***ETU02-MUX*** resides in the SNMP option card installed in the ***ETU02-MUX***. Configuration of the agent is accomplished via the terminal Control Port of the ***ETU02***. From the main menu select "3. Define System Parameter".

```
<<  Define System Parameter  >>

1.  Timing
2.  Main Link
3.  Sub Link
4.  Time Slot
5.  Data Port
6.  Date & Time
7.  SNMP Agent Setup

Enter 1-7 or Press "ESC" to previous menu.
```

From the "Define System Parameter" menu, select "7. SNMP Agent Setup".

This is the main menu for setting up the SNMP agent in the *ETU02*.

```
  <<  SNMP Agent Setup Menu  >>

1.  Set the Agent Information.
2.  Set Access Control Table.
3.  Set Trap Receivers Table.
4.  Set Community String. < Public >
5.  Save Parameter to SNMP Card and Exit.

Enter 1-5 or Press "ESC" to previous menu.
```

"1. Set the Agent Information" will call the menu for setting the ETU02 SNMP agent information. The "Local IP address" and "Subnet Mask" are assigned to the SNMP agent (card) in the ETU02. The default gateway is for the network where the ETU02 is attached.

```
  <<  Set the Agent Information  >>

1.  Local IP Address.    <192.168.0.10>
2.  Subnet Mask.      <255.255.255.0>
3.  Gateway IP Address.      <0.0.0.0>

Enter 1-3 or Press "ESC" to previous menu.
```

"2. Set Access Control Table" will call the menu for setting the IP address of the management workstation which will access the ETU02 SNMP and set the access permissions read/write or read only.

```
  <<  Set Access Control Table  >>

1.  Input Access IP Address.<0.0.0.0>
2.  Input Access Permission.<Read Only>

Enter 1-2 or Press "ESC" to previous menu.
```

"3. Set Trap Receivers Table" will call the menu for setting the IP address of the management workstation which will receive any "trap" messages sent by the ETU02 SNMP. In addition, the severity level of the messages may be set to informational, warning, or severe. In most cases the trap receiver and management workstation are the same. However, the option exists to provide separate addresses, one for management and one for traps.

```
  <<  Set Trap Receiver Table  >>


1.  Input Receiver IP.       <0.0.0.0>
2.  Input Severity.      <Information>

Enter 1-2 or Press "ESC" to previous menu.
```

"4. Set Community String." Will call the menu to set the community string. The default string is "public".

```
  <<  SNMP Agent Setup Menu  >>

1.  Set the Agent Information.
2.  Set Access Control Table.
3.  Set Trap Receivers Table.
4.  Set Community String. < Public >
5.  Save Parameter to SNMP Card and Exit.

Enter 1-5 or Press "ESC" to previous menu.

============================================
Input Community String.

Input String. (1 to 8 chars ) :
```

"5. Save Parameter to SNMP Card and Exit." will write the configuration data to the SNMP cards EEPROM (non-volatile ram). The settings are then automatically reloaded if power is lost and then restored to the unit.

```
  <<  SNMP Agent Setup Menu  >>

1.  Set the Agent Information.
2.  Set Access Control Table.
3.  Set Trap Receivers Table.
4.  Set Community String. < Public >
5.  Save Parameter to SNMP Card and Exit.

Enter 1-5 or Press "ESC" to previous menu.

Wait.........Config SNMP Card.
```

Wait until the following screen displays.

```
  <<  Define System Parameter  >>


1.  Timing
2.  Main Link
3.  Sub Link
4.  Time Slot
5.  Data Port
6.  Date & Time
7.  SNMP Agent Setup


Enter 1-7 or Press "ESC" to previous menu.
```

6-6 MIB detail for ETU02-MUX

First Child	Second Child	Leaf Object	AM	Set Variables list
systemEntry				
		systemMASTER-TIMING	RW	1:masterMAIN-LINK(0) 2:masterSUB-LINK(1) 3:masterINT-OSC(2) 4:masterCH-1-LINK(3) 5:masterCH-2-LINK(4) 6:masterCH-3-LINK(5) 7:masterCH-4-LINK(6)
		systemBACK-TIMING	RW	1:backMAIN-LINK(0) 2:backSUB-LINK(1) 3:backINT-OSC(2)
main-linkEntry				
		main-linkFRAME	RW	1:frame-CCS(0) 2:frame-CAS(1) 3:frame-UNFRAME(2)
		main-linkCRC-4	RW	1:crc-4-OFF(0) 2:crc-4-ON(1)
		main-linkIDLE-CODE	RW	1: (0…255)
		main-linkRAI	RW	1:rai-DISABLE(0) 2:rai-ENABLE(1)
		main-linkLINE-Code	RW	1:linecode-HDB3(0) 2:linecode-AMI(1)
		main-linkIMPEDANCE	RO	1:impedance-R120(0) 2:impedance-R75(1)
sub-linkEntry				
		sub-linkFRAME	RW	1:frame-CCS(0) 2:frame-CAS(1)
		sub-linkCRC-4	RW	1:crc-4-OFF(0) 2:crc-4-ON(1)
		sub-linkIDLE-CODE	RW	1: (0…255)
		sub-linkRAI	RW	1:rai-DISABLE(0) 2:rai-ENABLE(1)
		sub-linkLINE-Code	RW	1:linecode-HDB3(0) 2:linecode-AMI(1)
		sub-linkIMPEDANCE	RO	1:impedance-R120(0) 2:impedance-R75(1)

First Child	Second Child	Leaf Object	AM	Set Variables list
timeslotEntry				
		timeslotTS01	RW	1:ts01-NC(0) 2:ts01-CH-1(1) 3:ts01-CH-2(2) 4:ts01-CH-3(3) 5:ts01-CH-4(4) 6:ts01-SUB-DATA(5) 7:ts01-SUB-VOICE(6)
		timeslotTS02	RW	1:ts02-NC(0) 2:ts02-CH-1(1) 3:ts02-CH-2(2) 4:ts02-CH-3(3) 5:ts02-CH-4(4) 6:ts02-SUB-DATA(5) 7:ts02-SUB-VOICE(6)
		timeslotTS03		same as TS01
		timeslotTS04		same as TS01
		timeslotTS05		same as TS01
		timeslotTS06		same as TS01
		timeslotTS07		same as TS01
		timeslotTS08		same as TS01
		timeslotTS09		same as TS01
		timeslotTS10		same as TS01
		timeslotTS11		same as TS01
		timeslotTS12		same as TS01
		timeslotTS13		same as TS01
		timeslotTS14		same as TS01
		timeslotTS15		same as TS01
		timeslotTS16		same as TS01
		timeslotTS17		same as TS01
		timeslotTS18		same as TS01
		timeslotTS19		same as TS01
		timeslotTS20		same as TS01
		timeslotTS21		same as TS01
		timeslotTS22		same as TS01
		timeslotTS23		same as TS01
		timeslotTS24		same as TS01
		timeslotTS25		same as TS01

First Child	Second Child	Leaf Object	AM	Set Variables list
		timeslotTS26		same as TS01
		timeslotTS27		same as TS01
		timeslotTS28		same as TS01
		timeslotTS29		same as TS01
		timeslotTS30		same as TS01
		timeslotTS31		same as TS01
dataportEntry				
	dataportCH1	ch1-MULTIPLIER	RW	1:multiplierN64(0) 2:multiplierN56(1)
		ch1-CLOCK-MODE	RW	1:clockmodeDCE(0) 2:clockmodeDTE1(1) 3:clockmodeDTE2(2) 4:clockmodeDTE3(3)
		ch1-CTC	RW	1:ctsON(0) 2:ctcOFF(1)
		ch1-TcOut	RW	1:tcOutNORMAL(0) 2:tcOutINVERT(1)
		ch1-RcOut	RW	1:rcOutNORMAL(0) 2:rcOutINVERT(1)
		ch1-PORT-TYPE	RO	1:prottypeRESERVE(0) 2:prottypeRS-232(1) 3:prottypeET10(2) 4:prottypeX21(3) 5:prottypeG703(4) 6:prottypeV35(5) 7:prottypeRS530(6) 8:prottypeNO-INSERT(7)
		ch1-SPEED	RO	1:(0…2048)
		ch1-TxClock	RO	1:txclockNORMAL(0) 2:txclockINVERT(1)
	dataportCH2	same as dataportCH1		same as dataportCH1
	dataportCH3	same as dataportCH1		same as dataportCH1
	dataportCH4	same as dataportCH1		same as dataportCH1
controlportEntry				

First Child	Second Child	Leaf Object	AM	Set Variables list
	controlportSPEED		RW	1:speed300BPS(0) 2:speed600BPS(1) 3:speed1200BPS(2) 4:speed2400BPS(3) 5:speed4800BPS(4) 6:speed9600BPS(5) 7:speed19200BPS(6)
loopbackEntry				
	loopback-MAIN-LINK		RW	1:mainlink-LOOPBACK-OFF(0) 2:mainlink-LOCAL-ANALOG(1) 3:mainlink-LOCAL-DIGITAL(2) 4:mainlink-LOCAL-PAYLOAD(3) 5:mainlink-REMOTE-ANALOG(4) 6:mainlink-REMOTE-PAYLOAD(5)
	loopback-SUB-LINK		RW	1:sublink-LOOPBACK-OFF(0) 2:sublink-LOCAL-ANALOG(1) 3:sublink-LOCAL-DIGITAL(2) 4:sublink-LOCAL-PAYLOAD(3) 5:sublink-REMOTE-ANALOG(4) 6:sublink-REMOTE-PAYLOAD(5)
	loopback-CH1		RW	1:ch1-LOOPBACK-OFF(0) 2:ch1-LOCAL-ANALOG(1) 3:ch1-LOCAL-DIGITAL(2) 4:ch1-V54-LOOP(3)
	loopback-CH2			same as loopback-CH1
	loopback-CH3			same as loopback-CH1
	loopback-CH4			same as loopback-CH1
	loopback-ALL		RW	1:none(0) 2:all-LOOPBACK-OFF(1)
berttestEntry				
	berttestFUNCTION		RW	1:functionOFF(0) 2:functionON(1)
	berttestCHANNEL		RW	1:channelCH1(0) 2:channelCH2(1) 3:channelCH3(2) 4:channelCH4(3) 5:channelSL-ML(4) 6:channelSL-SL(5)

First Child	Second Child	Leaf Object	AM	Set Variables list
	berttestPATTERN		RW	1:pattern511(0) 2:pattern2047(1) 3:pattern2e15-1(2) 4:pattern2e20-1(3) 5:patternQRSS(4) 6:pattern2e23-1(5) 7:patternALL1(6) 8:patternALL0(7) 9:pattern0011(8) 10:pattern-3in24(9) 11:pattern-1in16(10) 12:pattern-1in8(11) 13:pattern-1in4(12)
	berttestERRINS		RW	1:errinsNONE(0) 2:errinsSINGLE(1) 3:errins10e-1(2) 4:errins10e-2(3) 5:errins10e-3(4) 6:errins10e-4(5) 7:errins10e-5(6) 8:errins10e-6(7) 9:errins10e-7(8)
	bertRESULT			
		resultBitErr	RO	1:(8) Octets
		resultBitErrRate	NA	1:(8) Octets
		resultBitErrRateRecount	RW	1:none (0) 2:recount (1)
dateAndTimeEntry				
		dateSet	RW	1:(8) Octets
		timeSet	RW	1:(8) Octets
miscellaneousEntry				
		miscellaneousLCD-LIGHT	RW	1:lcdlightAUTO(0) 2:lcdlightON(1) 3:lcdlightOFF(2)
		miscellaneousRESET-To-DEFAULT	RW	1:resettodefaultOFF(0) 2:resettodefaultON(1)

First Child	Second Child	Leaf Object	AM	Set Variables list
alarmEntry				
		alarmDisplay	RW	1:none(0) 2:display(1)
		alarmClear	RW	1:none(0) 2:clear(1)
performanceEntry		performanceClearAll	RW	1:none(0) 2:clear(1)
	performanceMainLink	mainlinkBPV	RO	(Integer display)
		mainlinkCRC4	RO	(Integer display)
		mainlinkCURR-ES	RO	(Integer display)
		mainlinkCURR-UAS	RO	(Integer display)
		mainlinkLONG-ES	RO	(Integer display)
		mainlinkLONG-UAS	RO	(Integer display)
		mainlinkCURR-SEC	RO	(Integer display)
		mainlinkLONG-SEC	RO	(Integer display)
	performanceSubLink	sublinkBPV	RO	(Integer display)
		sublinkCRC4	RO	(Integer display)
		sublinkCURR-ES	RO	(Integer display)
		sublinkCURR-UAS	RO	(Integer display)
		sublinkLONG-ES	RO	(Integer display)
		sublinkLONG-UAS	RO	(Integer display)
		sublinkCURR-SEC	RO	(Integer display)
		sublinkLONG-SEC	RO	(Integer display)
ledstatusEntry				
		ledstatusTEST	RO	1:testOFF(0) 2:testON(1)
		errorstatus	RO	1:errorOFF(0) 2:errorON(1)
		subalarmstatus	RO	1:subalarmOFF(0) 2:subalarmON(1)
		subSYNClossstatus	RO	1:synclossOFF(0) 2:synclossON(1)
		subSignallossstatus	RO	1:subSignallossOFF(0) 2:subSignallossON(1)
		mainAlarmstatus	RO	1:mainAlarmOFF(0) 2: mainAlarmON(1)

		mainSYNClossstatus	RO	1:mainSYNClossOFF(0) 2:mainSYNClossON(1)
		mainSignallossstatus	RO	1:mainSignallossOFF(0) 2:mainSignallossON(1)

Variable 1:

Data Port Type code:

0	1	2	3	4	5	6	7
Reserved	RS-232	ET10	X.21	G.703	V.35	RS-530	Not Insert

Variable 2:

Data Port Speed code: Unit :Kbps

	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32
N56	NC	56	112	168	224	280	336	392	448	504	560	616	672	728	784	840	896	952	1008	1064	1120	1176	1232	1288	1344	1400	1456	1512	1568	1624	1680	1736	2048
N64	NC	64	128	192	256	320	384	448	512	576	640	704	768	832	896	960	1024	1088	1152	1216	1280	1344	1408	1472	1536	1600	1664	1728	1792	1856	1920	1984	2048

Variable 3:

Bert Result transfer format:

	Text 1 (9)	Text 2 (10)	Text 3 (11)	Text 4 (12)	Text 5 (13)	Text 6 (14)	Text 7 (15)	Text 8 (16)
Bit Err	Byte 5	Byte 4	Byte 3	Byte 2	Byte 1	Byte 0	X	X
Bit Err Rate	0	•	0	e	-	0	0	X

Bit Err is 48 bits , have to transfer to ASCII for display
Bit Err Rate just an ASCII text string

Variable 4:

Date & Time transfer format (BCD code)

	Text 1 (9)	Text 2 (10)	Text 3 (11)	Text 4 (12)
0. DATE	Century (19-20)	Year (00-99)	Month (01-12)	Date (01-31)
1. TIME	Hour (00-23)	Minute (00-59)	Second (00-59)	

MIB path

iso(1).org(3).dod(6).internet(1).private(4).enterprise(1).ctcu(4756).ctcETU02(2)

6-7 ETU02-MUX Trap Codes

Code	Error message	Error status On/Off
0	Alarm Buffer Empty	0:None
1	Power Turn	1:On 2:Off
2	Main Link Signal Loss	1:On 2:Off
3	Main Link SYNC Loss	1:On 2:Off
4	Main Link AIS	1:On 2:Off
5	Main Link RAI	1:On 2:Off
6	Main Link MRAI	1:On 2:Off
7	Main Link BPV	0:None
8	Main Link Frame Slip	0:None
9	Main Link CRC4 Error	0:None
10	Sub Link Signal Loss	1:On 2:Off
11	Sub Link SYNC Loss	1:On 2:Off
12	Sub Link AIS	1:On 2:Off
13	Sub Link RAI	1:On 2:Off
14	Sub Link MRAI	1:On 2:Off
15	Sub Link BPV	0:None
16	Sub Link Frame Slip	0:None
17	Sub Link CRC4 Error	0:None
18	Channel 1 port FIFO Slip	0:None
19	Channel 2 port FIFO Slip	0:None
20	Channel 3 port FIFO Slip	0:None
21	Channel 4 port FIFO Slip	0:None
22	Channel 1 port Baud Rate Failure	0:None
23	Channel 2 port Baud Rate Failure	0:None
24	Channel 3 port Baud Rate Failure	0:None
25	Channel 4 port Baud Rate Failure	0:None
26	End of Alarm Buffer	0:None

Alarm message Transfer format:

Text 1 (9)	Text 2 (10)	Text 3 (11)	Text 4 (12)	Text 5 (13)	Text 6 (14)	Text 7 (15)	Text 8 (16)
Message Type Code	On/Off Code	Year (BCD)	Month (BCD)	Date (BCD)	Hour (BCD)	Minute (BCD)	Second (BCD)

Variable 6:

LED Status:

Parameter							
Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Test	Error	Sub Alarm	Sub SYNC Loss	Sub Signal Loss	Main Alarm	Main SYNC Loss	Main Signal Loss

Chapter 7. Troubleshooting Instructions

In case a problem occurs, check the displayed alarm messages and refer to the Status indication and Message section in Table 5-2.

NO.	Trouble Symptoms	Probable cause	Corrective measure
1	PWR indicator off	No AC power.	Check that both ends of the AC power cable are properly connected.
		Blown fuse.	Replace with fuse of proper rating.
		Defective ***ETU02-MUX.***	Replace the ***ETU02-MUX.***
2	PWR indicator flashes	Hardware failure.	Replace the ***ETU02-MUX.***
3	MAIN E1 Signal Loss indicator on	No signal received from the remote device.	Check cable connections to the main link connector. Check other equipment providing the link to the ***ETU02-MUX***. Activate the local analog loop back on the main link. Check if the ***ETU02-MUX*** MAIN E1 Sync Loss indicator is off, then the problem is external.
		Defective ***ETU02-MUX.***	Replace the ***ETU02-MUX.***
4	MAIN E1 Sync Loss indicator on	Wrong frame format.	Check cable connections to the main link connector. Check other equipment providing the same frame link to the ***ETU02-MUX*** or reset local ***ETU02-MUX*** frame format.
		Defective ***ETU02-MUX.***	Replace the ***ETU02-MUX.***
5	MAIN E1 Alarm indicator on	BPV error, Excessive noise on the line from remote device.	Check that line attenuation does not exceed that specified for E1 line. Check other equipment providing the same line code to the ***ETU02-MUX***.
		CRC-4 error.	Check other equipment providing the same frame link to the ***ETU02-MUX***.
		Received AIS signal.	Problem at the equipment connector to the remote end of the link.
		Received RAI or MRAI signal.	Problem at the equipment connector to the remote end of the link.

NO.	Trouble Symptoms	Probable cause	Corrective measure
6	SUB E1 Signal Loss indicator on	No signal receive from the remote device.	Check cable connections to the sub link connector. Check other equipment providing the link to the ***ETU02-MUX***. Activate the local analog loop back on the sub link. Check if the ***ETU02-MUX*** SUB E1 Sync Loss indicator is off, then the problem is external.
		Defective ***ETU02-MUX.***	Replace the ***ETU02-MUX.***
7	SUB E1 Sync Loss indicator on	Wrong frame format.	Check cable connections to the sub link connector. Check other equipment providing the same frame link to the ***ETU02-MUX*** or reset local ***ETU02-MUX*** frame format.
		Defective ***ETU02-MUX.***	Replace the ***ETU02-MUX.***
8	SUB E1 Alarm indicator on	BPV error, Excessive noise on the line from the remote device.	Check that line attenuation does not exceed that specified for E1 line. Check other equipment providing the same line code to the ***ETU02-MUX***.
		CRC-4 error.	Check other equipment providing the same frame link to the ***ETU02-MUX***.
		Received AIS signal.	Problem at the equipment connector to the remote end of the link.
		Received RAI or MRAI signal.	Problem at the equipment connector to the remote end of the link.

Appendix A. DIP Switch Setting

A-1 DSW1 Setting

DSW1	STATE	FUNCTION	CONDITION
-1	OFF	Reserved	
	ON	Reserved	
-2	OFF	Reserved	
	ON	Reserved	
-3	OFF	Reserved	
	ON	Reserved	
-4	OFF	Reserved	
	ON	Reserved	
-5	OFF	Reserved	
	ON	Reserved	

A-2 DSW2 Main E1 Line Impedance Setting

DSW2	STATE	FUNCTION	CONDITION
ALL	OFF	120 ohm balanced	Factory setting
	ON	75 ohm unbalanced	

DSW2 is located on the main PC board.

A-3 SW1 Sub E1 Line Impedance Setting

SW1	STATE	FUNCTION	CONDITION
ALL	OFF	120 ohm balanced	Factory setting
	ON	75 ohm unbalanced	

SW1 are located on the Sub E1 interface card.

A-4 Jumper CHASS1 Frame Ground Setting

CHASS1	STATE	FUNCTION	CONDITION
ALL	DIS	Frame ground not connected to signal	Factory setting
	CON	Frame ground connected to signal ground	

CHASS1 is located on the main PC board close to DSW2.

Appendix A. DIP Switch Setting

Appendix B. Connections

B-1. E1 Line Connectors

B-1.1 D-15 connector

The E1 link D-15 connector conforms to AT&T Pub 62411. The physical interface is a 15-pin female D-type connector.

Pin	Designation	Direction	Function
1	TTIP	From ***ETU02-MUX***	Transmit data
2	FG	↔	Frame ground
3	RTIP	To ***ETU02-MUX***	Receive data
4	FG	↔	Frame ground
5	--	--	--
6	--	--	--
7	--	--	--
8	--	--	--
9	TRING	From ***ETU02-MUX***	Transmit data
10	--	--	--
11	RRING	To ***ETU02-MUX***	Receive data
12	--	--	--
13	--	--	--
14	--	--	--
15	--	--	--

Table B-1 E1 D-15 connector pin allocation

B-1.2 BNC connector

Conn.	Pin	Designation	Direction	Function
TX	Center	TTIP	From ***ETU02-MUX***	Transmit data
	Sleeve	TRING	↔	Signal return
RX	Center	RTIP	To ***ETU02-MUX***	Receive data
	Sleeve	RRING	↔	Signal return

Table B-2 E1 BNC connector pin allocation

B-2. RS-232/Alarm Port Connector

The ***ETU02-MUX*** RS-232/ALARM port is located on the front panel and has a standard RS-232 DCE interface with a 9-pin female D-type connector, wired in accordance with Table B-8.

Pin	RS-232 Function	Direction	Connected to Terminal		Alarm Relay function
			DB9	DB25	
1	Data Carrier Detect (DCD)	Output	1	8	
2	Receive Data (RD)	Output	2	3	
3	Transmit Data (TD)	Input	3	2	
4					Normally closed (NC)
5	Signal Ground		5	7	
6					Common contact (COM)
7	Request To Sent (RTS)	Input	7	4	
8	Clear To Sent (CTS)	Output	8	5	
9					Normally open (NO)

Table B-8 RS-232/ALARM port connector pin allocation

C-1. X.21 Data Channel Module

For applications using an X.21 interface external clock (Clock mode select DTE1 or DTE3), connect the input clock to pins 7(A) and 14(B) of the DB15-pin connector.

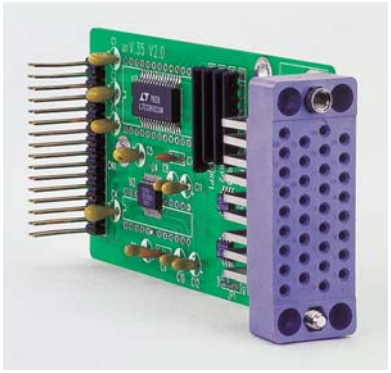
X.21 Interface, pin assignment

SIGNAL FUNCTION	PIN	CIRCUIT	DIRECTION	DESCRIPTION

Protective Ground	1	Shield	↔	Chassis ground. May be isolated from Signal Ground.
Signal Ground	8	G	↔	Common signal ground.
Transmitted Data	2 9	T(A) T(B)	To ***ETU02-MUX***	Serial digital data from DTE.
Received Data	4 11	R(A) R(B)	Fm ***ETU02-MUX***	Serial digital data at the output of the ***ETU02-MUX*** receiver.
Request to Sent	3 10	C(A) C(B)	To ***ETU02-MUX***	An ON signal to the ***ETU02-MUX*** when data transmission is desired.
Data Carrier Detect	5 12	I(A) I(B)	Fm ***ETU02-MUX***	Constantly ON, except when a loss of the received carrier signal is detected.
Signal Timing	6 13	S(A) S(B)	Fm ***ETU02-MUX***	A transmit data rate clock for use by an external data source.
External Transmit clock	7 14	B(A) B(B)	To ***ETU02-MUX***	A serial data rate clock input from the data source.
--	15	--	--	--

Table C-1 X.21 data channel connector pin allocation

C-2. V.35 Data Channel Module



Utilizes standard pin-out. The three test pins have been chosen for loops and test. For applications requiring a DTE V.35 interface, clock mode is selected DTE2. Connect the ERC input clock to pins Z(A) and BB(B).

V.35 Interface, pin assignment

SIGNAL FUNCTION	PIN	CIRCUIT	DIRECTION	DESCRIPTION
Protective Ground	A	Frame	↔	Chassis ground. May be isolated from signal ground.
Signal Ground	B	Signal Ground	↔	Common signal ground.
TD	P S	TD(A) TD(B)	To ***ETU02-MUX***	Serial digital data from DTE.
RD	R T	RD(A) RD(B)	Fm ***ETU02-MUX***	Serial digital data at the output of the ***ETU02-MUX*** receiver.
RTS	C	RTS	To ***ETU02-MUX***	An ON signal to the ***ETU02-MUX*** when data transmission is desired.
CTS	D	CTS	Fm ***ETU02-MUX***	Constantly ON.
DSR	E	DSR	Fm ***ETU02-MUX***	Constantly ON, except during test loops.
DTR	H	DTR	To ***ETU02-MUX***	Not used.
DCD	F	DCD	Fm ***ETU02-MUX***	Constantly ON, except when a loss of the received carrier signal is detected.
ETC	U W	ETC(A) ETC(B)	To ***ETU02-MUX***	A transmitted data rate clock input from the data source.
Transmit Clock	Y AA	TC(A) TC(B)	Fm ***ETU02-MUX***	A transmitted data rate clock for use by an external data source.
Receive Clock	V X	RC(A) RC(B)	Fm ***ETU02-MUX***	A received data rate clock for use by an external data source.
External Receive clock	Z BB	ERC(A) ERC(B)	To ***ETU02-MUX***	A received serial data rate clock input from the DTE.
Remote Loop back	HH	RL	To ***ETU02-MUX***	When on, commands ***ETU02-MUX*** into remote loop back, can disable by DIPSW.
Local Loop back	JJ	LL	To ***ETU02-MUX***	When on, commands ***ETU02-MUX*** into local loop back.
Test Indicator	KK	TM	Fm ***ETU02-MUX***	ON during any test mode

Table C-2 V.35 data channel connector pin allocation

C-3. RS-530 Data Channel Module

Utilizes standard pin-out on a DB25-pin connector. The three test pins have been chosen for loops and test. For applications requiring a DTE RS-530 interface, clock mode DTE2 is selected. Connect the ERC input clock to pins 20(A) and 23(B).

RS-530 Interface, pin definition

SIGNAL Function	PIN	CIRCUIT	DIRECTION	DESCRIPTION
Protective Ground	1	Frame	↔	Chassis ground. May be isolated from signal ground.
Signal Ground	7	AB	↔	Common signal ground.
Transmitted Data	2 14	BA(A) BA(B)	To ***ETU02-MUX***	Serial digital data from DTE.
Received Data	3 16	BB(A) BB(B)	Fm ***ETU02-MUX***	Serial digital data at the output of the ***ETU02-MUX*** receiver.
Request to Sent	4 19	CA(A) CA(B)	To ***ETU02-MUX***	A ON signal to the ***ETU02-MUX*** when data transmission is desired.
Clear to Sent	5 13	CB(A) CB(B)	Fm ***ETU02-MUX***	Constantly ON.
Data Set Ready	6 22	CC(A) CC(B)	Fm ***ETU02-MUX***	Constantly ON, Except during test loops.
Data Terminal Ready	20 23	CD(A) CD(B)	To ***ETU02-MUX***	DTR not used, used for a received serial data rate clock input from the DTE.
Data Carrier Detect	8 10	CF(A) CF(B)	Fm ***ETU02-MUX***	Constantly ON, except when a loss of the received carrier signal is detected.
External Transmit clock	24 11	DA(A) DA(B)	To ***ETU02-MUX***	A transmitted data rate clock input from the data source.
Transmit Clock	15 12	DB(A) DB(B)	Fm ***ETU02-MUX***	A transmitted data rate clock for use by an external data source.
Receive Clock	17 9	DD(A) DD(B)	Fm ***ETU02-MUX***	A received data rate clock for use by an external data source.
Remote Loop back	21	RL	To ***ETU02-MUX***	When on, commands ***ETU02-MUX*** into remote loop back.
Local Loop back	18	LL	To ***ETU02-MUX***	When on, commands ***ETU02-MUX*** into local loop back.
Test Indicator	25	TM	Fm ***ETU02-MUX***	ON during any test mode

Table C-3 RS-530 data channel connector pin allocation

C-4. RS-232 Data Channel Module

Utilizes standard pin-out on a DB25-pin connector. The three test pins have been chosen for loops and test. For applications requiring a DTE RS-232 interface, clock mode is selected DTE2. Connect the ERC input clock to pins 20. The RS-232 maximum clock rate is 128Kbps. For asynchronous use, divide the synchronous rate by 3.3 (64K /3.3 = 19.2K Async). Do not exceed two timeslots assigned (128Kbps) for RS-232.

RS-232 Interface, pin assignment

SIGNAL Function	PIN	CIRCUIT	DIRECTION	DESCRIPTION
Protective Ground	1	AA	↔	Chassis ground. May be isolated from signal ground.
Signal Ground	7	AB	↔	Common signal ground.
Transmitted Data	2	BA	To ***ETU02-MUX***	Serial digital data from DTE.
Received Data	3	BB	Fm ***ETU02-MUX***	Serial digital data at the output of the ***ETU02-MUX*** receiver.
Request to Sent	4	CA	To ***ETU02-MUX***	A ON signal to the ***ETU02-MUX*** when data transmission is desired.
Clear to Sent	5	CB	Fm ***ETU02-MUX***	Constantly ON.
Data Set Ready	6	CC	Fm ***ETU02-MUX***	Constantly ON, Except during test loops.
Data Terminal Ready	20	CD	To ***ETU02-MUX***	DTR not used, used for a received serial data rate clock input from the DTE.
Data Carrier Detect	8	CF	Fm ***ETU02-MUX***	Constantly ON, except when a loss of the received carrier signal is detected.
External Transmit clock	24	DA	To ***ETU02-MUX***	A transmitted data rate clock input from the data source.
Transmit Clock	15	DB	Fm ***ETU02-MUX***	A transmitted data rate clock for use by an external data source.
Receive Clock	17	DD	Fm ***ETU02-MUX***	A received data rate clock for use by an external data source.
Remote Loop back	21	RL	To ***ETU02-MUX***	When on, commands ***ETU02-MUX*** into remote loop back.
Local Loop back	18	LL	To ***ETU02-MUX***	When on, commands ***ETU02-MUX*** into local loop back.
Test Indicator	25	TM	Fm ***ETU02-MUX***	ON during any test mode

Table C-4 RS-232 data channel connector pin allocation

C-5. RS-530 to RS-449 Adapter Cable

When the ***ETU02-MUX*** is ordered with an RS-449 interface, the physical interface is a 37-pin male D-type connector wired in accordance with Table C-5.

RS-530 to RS-449 adapter cable

SIGNAL FUNCTION	RS-530 PIN	RS-449 PIN	RS-449 CIRCUIT	DESCRIPTION
Protective Ground	1	1	Frame	Chassis ground. May be isolated from signal ground.
Signal Ground	7	19,20, 37	SG,RC, SC	Common signal ground.
Transmitted Data	2 14	4 22	SD(A) SD(B)	Serial digital data from DTE.
Received Data	3 16	6 24	RD(A) RD(B)	Serial digital data at the output of the ***ETU02-MUX*** receiver.
Request to Sent	4 19	7 25	RS(A) RS(B)	A ON signal to the ***ETU02-MUX*** when data transmission is desired.
Clear to Sent	5 13	9 27	CS(A) CS(B)	Constantly ON.
Data Set Ready	6 22	11 29	DM(A) DM(B)	Constantly ON, Except during test loops.
Data Terminal Ready	20 23	12 30	TR(A) TR(B)	DTR not used, used for a received serial data rate clock input from the DTE.
Data Carrier Detect	8 10	13 31	RR(A) RR(B)	Constantly ON, except when a loss of the received carrier signal is detected.
External Transmit clock	24 11	17 35	TT(A) TT(B)	A transmitted data rate clock input from the data source.
Transmit Clock	15 12	5 23	ST(A) ST(B)	A transmitted data rate clock for use by an external data source.
Receive Clock	17 9	8 26	RT(A) RT(B)	A received data rate clock for use by an external data source.
Remote Loop back	21	14	RL	When on, commands ***ETU02-MUX*** into remote loop back.
Local Loop back	18	10	LL	When on, commands ***ETU02-MUX*** into local loop back.
Test Indicator	25	18	TM	ON during any test mode

Table C-5 RS-530 to RS-449 pin allocation

C-6. G.703-64K Co-directional Interface Module

Utilizing a standard DB15F connector, this module provides an ITU-T G.703 64K Co-directional interface for transmission on 4 wires (two twisted pairs).

G.703/64Kbps Interface, pin assignment

SIGNAL Function	PIN	DIRECTION	DESCRIPTION
Protective Ground	4 10	↔	Chassis ground. May be isolated from signal ground.
Signal Ground	8	↔	Common signal ground.
Transmitted Data	3 11	To ***ETU02-MUX***	Serial co-directional data from DTE.
Received Data	1 9	Fm ***ETU02-MUX***	Serial co-directional data at the output of the ***ETU02-MUX*** receiver.
Request to Sent	4	To ***ETU02-MUX***	A ON signal to the ***ETU02-MUX*** when data transmission is desired.

Table C-6 G.703 64K Co-directional interface, pin allocation

G.703/64Kbps Co-directional Interface Specifications

Compliance with	ITU-T G.703
Line code	64Kbps Co-directional line code
Line	4 wires, one symmetric pair for each direction
Interface Connectors	15 pin D-type female
Range	Up to 800 meters (0.5 miles)
Impedance	120 ohms
Peak voltage of a “mark” (pulse)	Nominal 1.0V±10%
Peak voltage of a “space”(no pulse)	0V ±0.10V
Single pulse width	Nominal 3.9us
Double pulse width	Nominal 7.8us
Clock frequency	64 KHz
Frequency tracking	±100ppm
Frame format	Unframed only

C-7. NRZ/BNC 64K ~ 2048Kbps NRZ Interface Module

Utilizing four standard BNC connectors, this module provides an NRZ interface for transmission on 4 coaxial cables. Please refer to the table below for details of the pin out information.

NRZ/BNC interface

SIGNAL FUNCTION	DIRECTION	DESCRIPTION
Received Data	Fm ***ETU02-MUX***	Serial NRZ data at the output of the ***ETU02-MUX*** receiver.
Received Timing	Fm ***ETU02-MUX***	Serial NRZ timing at the output of the ***ETU02-MUX*** receiver.
Transmitted Data	To ***ETU02-MUX***	Serial NRZ data from DTE.
Transmit Timing	To ***ETU02-MUX***	Serial NRZ timing from DTE.

Table C-7. G.703 NRZ/BNC pin allocation

Specifications:

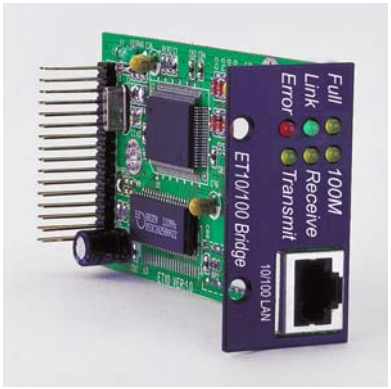
Line Code:	NRZ
Impedance:	50 ohms
Signal Level:	Logic "1": 0V +/- 0.3V
	Logic "0": -1.5V +/- 0.3V
Speed:	2048K Max.

Settings: (by adjustment of jumpers on interface card)

Rx timing; "Normal" or "Inverted"

Tx timing; "Normal" or "Inverted"

C-8. ET10/100 Ethernet Bridge Module



Utilizes standard pin out on one RJ-45 connector, providing connection to Ethernet (10Base-T) or Fast Ethernet (100Base-TX) networks utilizing UTP (unshielded twisted pair) cabling. Please refer to the Appendix B for details of the pin out information.

MDI	MDI-X
1. Tx +	1. Rx +
2. Tx -	2. Rx -
3. Rx +	3. Tx +
6. Rx -	6. Tx -

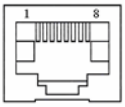


Table C-8a ET10/100 pin allocation

DIP Switch Settings

DIP	State	Function
1	ON*	Enable MAC filtering
	OFF	Disable Filtering (repeater)
2	ON	Enable 802.3x flow control
	OFF*	Disable 802.3x flow control
3	ON	NO Auto-negotiation
	OFF*	Auto-negotiation
4	ON	Half Duplex[1]
	OFF*	Full Duplex[1]
5	ON	10BASE-T LAN speed[1]
	OFF*	100BASE-TX LAN speed[1]
6	ON	Enable Auto MDIX
	OFF*	MDI (1:1 to HUB)
7 | 8	OFF OFF	Memory configuration #1
	ON OFF	Memory configuration #2
	OFF ON	Memory configuration #3
	ON ON	Reserved

Table C-8b DIP switch settings

* factory default settings

[1] no effect when sw3 is off (auto-negotiation is on)

LED Indicators

Designation	Indication
Full (yellow)	ON=Full Duplex
Link (green)	ON=LAN Link
Error (red)	ON=LAN Error
100M (yellow)	ON=Fast Ethernet
Receive (yellow)	ON=LAN Rx data
Transmit(yellow)	ON=LAN Tx data

Table C-8c LED indicators

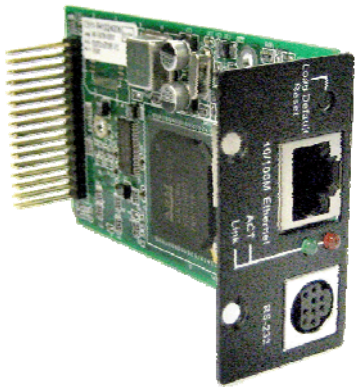
Memory configuration detail

#1 LAN to WAN 308 packets, WAN to LAN 32 packets

#2 LAN to WAN 170 packets, WAN to LAN 170 packets

#3 LAN to WAN 32 packets, WAN to LAN 308 packets

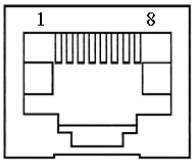
C-9. ET100R Ethernet Router Module

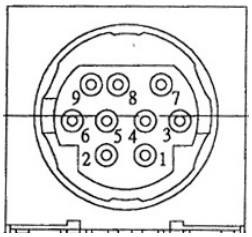


When the ***ETU02-MUX*** is ordered with an **ET100R Interface**, the unit is not only an access unit for E1, but also becomes a high performance router for 10Base-T or 100Base-TX Ethernet LAN connection. The **ET100R** utilizes standard pin out on one RJ-45 connector, providing connection to Ethernet (10Base-T) or Fast Ethernet (100Base-TX) networks over UTP (unshielded twisted pair) cabling.

Configuration of the router is beyond the scope of this manual. Please refer to the CDROM based instructions that are included with the router module. The ET100R router module is configured with the CLI Telnet or Web based GUI. The user manual and quick start guide are included on the CDROM. Alternately the router may be configured via the RS-232 console port. A special cable must be used to connect to the modules DIN connector. Pinouts are provided below for reference.

MDI
1. Tx +
2. Tx -
3. Rx +
6. Rx -





RS-232
DCE

PIN	Circuit	Direction	Description
1	NC		
2	RD	OUT	Receive data
3	TD	IN	Transmit data
4	DTR	IN	Data Terminal Ready
5	GND		Signal ground
6	DSR	OUT	Data Set Ready
7	RTS	IN	Request to Send
8	CTS	OUT	Clear to Send
9	NC		

Table C-9 Console port, RS-232, pin allocation

Specifications

CPU

Hi-Perf. 32 bit ARM 9 RISC CPU

Network Protocols

TCP/IP, DHCP, ARP, PPP, HDLC,

Cisco HDLC, NAT (SNAT, DNAT)

Routing Protocols

Static, RIP I, RIP II

DTE Baud rate

Synchronous ≤ 2M bps

WAN Support

T1/E1

LAN Support

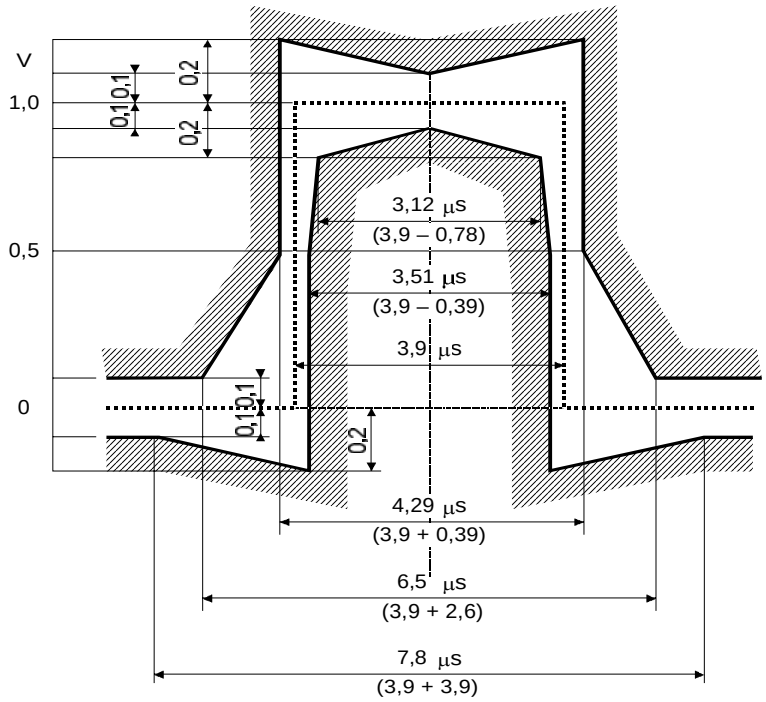
10Base-T / 100Base-TX, Auto MDIX

Memory

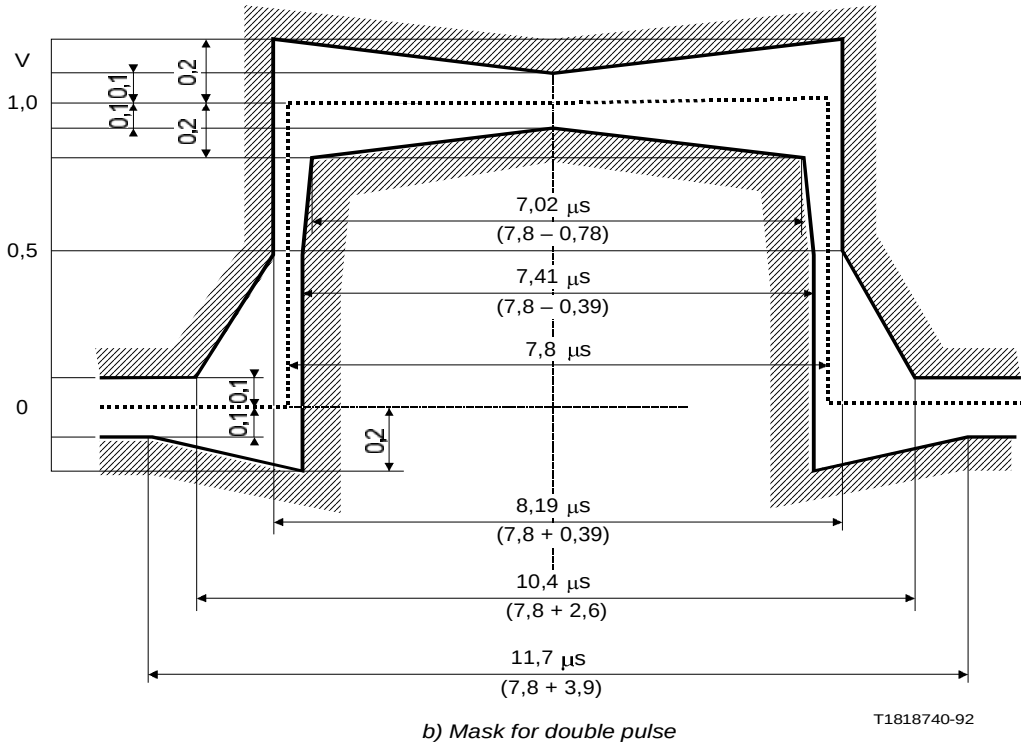
32M bytes SDRAM

8M bytes Flash Memory

Figure C10：Single pulse & double pulse sample figure



a) Mask for single pulse



b) Mask for double pulse

Note – The limits apply to pulses of either polarity.

FIGURE 5/G.703

Pulse masks of the 64 kbit/s codirectional interface

Appendix D. Menu System

Menu System Quick Outline

ROOT MENU	LEAF MENU	AVAILABLE SETTINGS	
SYSTEM	MASTER TIMING	MAIN LINK	SUB LINK
		INT OSC*	CH 1 LINK
		CH 2 LINK	CH 3 LINK
		CH 4 LINK	
	BACKUP TIMING	MAIN LINK	SUB LINK
		INT OSC*	
MAIN LINK	FRAME	CCS*	CAS
		UNFRAME	
	CRC-4	OFF*	ON
	IDLE CODE	00~FF	7E*
	RAI (Remote Alarm Indicator)	DISABLE*	ENABLE
	LINE CODE	HDB3*	AMI
	IMPEDANCE	RO(DIP settings)	
	RMT LOOP	OFF*	ON
SUB LINK	FRAME	CCS*	CAS
	CRC-4	OFF*	ON
	IDLE CODE	00~FF	7E*
	RAI (Remote Alarm Indicator)	DISABLE*	ENABLE
	LINE CODE	HDB3*	AMI
	IMPEDANCE	RO(DIP settings)	75 OR 120
	RMT LOOP	OFF*	ON
TIMESLOT MAPPING		FRAMING	F
		SIGNALING	S
		NOT ASSIGNED	N
		DATA 1~4	1~4
		DATA ON E1	D
		VOICE ON E1	V
DATA PORT	MULTIPLIER	N64*	N56
	CLOCK MODE	DCE*	DTE1
		DTE2	DTE3
	CTS	ON*	RTS
	TC OUT	NORMAL*	INVERTED
	RC OUT	NORMAL*	INVERTED
CONTROL PORT	SPEED	300	600
		1200	2400
		4800	9600*
		19200	
LOOP BACK	MAIN LINK	OFF*	
		LOCAL ANALOG	
		LOCAL DIGITAL	
		LOCAL PAYLOAD	
		REMOTE ANALOG	
		REMOTE PAYLOAD	
	SUB LINK	OFF*	
		LOCAL ANALOG	
		LOCAL DIGITAL	
		REMOTE LOOP	
	CHANNEL 1 (~4)	OFF*	
		LOCAL ANALOG	
		LOCAL DIGITAL	
		V.54 LOOP	
BERT TEST	FUNCTION	OFF*	ON
	CHANNEL	1*	2
		3	4
		SL-ML	SL-SL
	PATTERN	511*	2047
		2E15-1	2E20-1
		QRSS	2E23-1
		ALL 1	ALL 0
		ALT	0011
		3IN24	1IN16
		1IN8	1IN4
	INSERT ERROR	NONE*	SINGLE
		10E-1	10E-2
		10E-3	10E-4
		10E-5	10E-6
		10E-7	
	RESULT	(DISPLAY BERT RESULTS)	
DATE & TIME	DISPLAY / DEFINE		
MISCELLANEOUS	LCD	AUTO*	ON
		OFF	
	RESET TO DEFAULT	(RESET TO FACTORY DEFAULTS)	
ALARM BUFFER	DISPLAY	(LIST ALARMS IN BUFFER)	
	CLEAR	(CLEAR ALARMS FROM BUFFER)	
PERFORMANCE	DISPLAY	MAIN LINK	SUB LINK
	CLEAR	(CLEAR PERFORMANCE BUFFER)	

* indicates factory default settings

Notes:

ETU02-MUX TECHNICAL INQUIRY FORM

CTC Union Technologies Inc.

Fax:(886)2 27991355

Tel:(886)2 26591021

E-mail:support@ctcu.com

Taipei, Taiwan

Attn : Technical Support Division

From Company: _____

Name: _____

Tel: ( ) _____

Fax:( ) _____

■ **MODEL: ETU02-MUX/AC ☐ ETU02-MUX/DC ☐ ETU02-MUX/DP ☐**

■ **ACTIVITY: As attached in Parameter setting table**

■ **SYS CONFIGURATION:**

■ **Question:**

CHANNEL I/F MODULE INFORMATION; CHECK INSTALLED MODULES

PORT 1	232☐	V35☐	530☐	X21☐	449☐	G64☐	NRZ☐	ET10☐	ET10R☐	ET100☐
PORT 2	232☐	V35☐	530☐	X21☐	449☐	G64☐	NRZ☐	ET10☐	ET10R☐	ET100☐
PORT 3	232☐	V35☐	530☐	X21☐	449☐	G64☐	NRZ☐	ET10☐	ET10R☐	ET100☐
PORT 4	232☐	V35☐	530☐	X21☐	449☐	G64☐	NRZ☐	ET10☐	ET10R☐	ET100☐

PARAMETERS	USER SETTINGS; CHECK ALL THAT ARE APPLICABLE
MASTER TIMING	MAIN☐ SUB☐ INT.OSC☐ CH1☐ CH2☐ CH3☐ CH4☐
BACKUP TIMING	MAIN☐ SUB☐ INT.OSC☐
MAIN FRAME	CCS(PCM31)☐ CAS(PCM30)☐ UNFRAME☐
MAIN CRC4	OFF☐ ON☐
MAIN IDLE CODE	7E☐ Other_____
MAIN RAI	DISABLE☐ ENABLE☐
MAIN LINE CODE	HDB3☐ AMI☐
MAIN IMPEDANCE	75Ω(BNC)☐ 120Ω(TP)☐
MAIN RMT LOOP	OFF☐ ON☐
SUB FRAME	CCS(PCM31)☐ CAS(PCM30)☐
SUB CRC4	OFF☐ ON☐
SUB IDLE CODE	7E☐ Other_____
SUB RAI	DISABLE☐ ENABLE☐
SUB LINE CODE	HDB3☐ AMI☐
SUB IMPEDANCE	75☐ 120☐
TIMESLOT MAP	F=FRAMING; S=SIGNALING;

N=NOT ASSIGNED	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1~4=PORT	F															
D=DATA ON E1	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
V=VOICE ON E1																

DATA PORTS:	PORT 1	PORT 2	PORT 3	PORT 4
PORT MULTIPLIER	N64☐ N56☐	N64☐ N56☐	N64☐ N56☐	N64☐ N56☐
CLOCK MODE	DCE☐ DTE1☐ DTE2☐ DTE3☐	DCE☐ DTE1☐ DTE2☐ DTE3☐	DCE☐ DTE1☐ DTE2☐ DTE3☐	DCE☐ DTE1☐ DTE2☐ DTE3☐
CTS	ON☐ RTS☐	ON☐ RTS☐	ON☐ RTS☐	ON☐ RTS☐
TC OUT	NORMAL☐ INVERT☐	NORMAL☐ INVERT☐	NORMAL☐ INVERT☐	NORMAL☐ INVERT☐
RC OUT	NORMAL☐ INVERT☐	NORMAL☐ INVERT☐	NORMAL☐ INVERT☐	NORMAL☐ INVERT☐
CONTROL PORT	300☐ 600☐ 1200☐ 2400☐ 4800☐ 9600☐ 19200☐			

Transmission Series

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